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Castings That Withstand Heat and Corrosion



REDUCTION of chromium and chromium-nickel castings, containing appreciable amounts of one or both of these two elements, is increasing rapidly in this country. Such castings are ordinarily used for high temperature applications and for resistance to corrosion. They might be classified, roughly, in distinction to what are generally called "alloy steel castings," as castings containing over 10 per cent chromium, or chromium and nickel combined.

Some Early Developments

Nickel-chromium castings, for use at high temperatures, were first produced in commercial quantities about 1914. They were made into carburizing containers and other heat-treating equipment and a little later into various furnace parts, 60 per cent nickel and 12 per cent chromium, the remainder mostly iron, was

a typical analysis. For some time most castings produced contained a predominance of nickel and were used almost entirely for high temperature service.

Later developments emphasized the importance of chromium as an alloying element to resist corrosion, including scaling from heat. About 1921 castings were being produced which contained as high as 30 per cent chromium with no nickel. Since that time developments have been rapid. There are probably 35 foundries now producing chromium and chromium-nickel castings in various combinations of these two elements.

In a general way, castings in which nickel predominates are used for high temperature applications (2100 to 2200 deg. Fahr. being about the practicable upper temperature limit). Chromium-iron castings (with or without some nickel) are used for high temperature service and also for corrosion resistance. Addition of nickel greatly increases the strength at elevated temperatures, but seriously weakens resistance to attack from sulphur gases. High chromium-iron castings resist oxidation and sulphur gases satisfactorily at high temperatures, but do not have the strength of the nickel-chromium castings. An alloy

¶ Thirty-five Foundries Now Making Corrosion and Heat-resisting Castings

¶ Their Manufacture Requires Great Care in Attention to All Details

¶ Shrinkage Difficulties Are Intensified

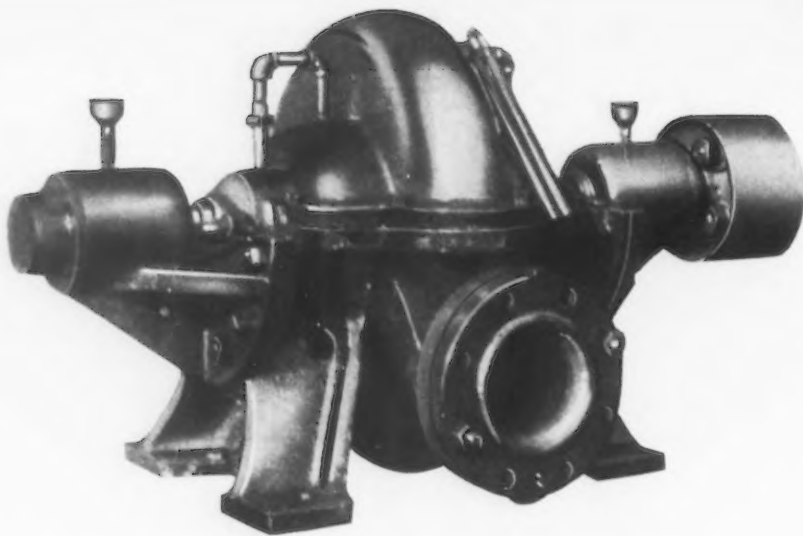
¶ Higher Prices Justified by Longer Service

¶ Some Products Combine Abrasion and Corrosion Resistance

¶ Potential Production Far in Excess of Demand



W. F. Furman
Vice-president, Duraloy
Co., Pittsburgh



impervious to sulphur attack, and with at least the high temperature strength of the nickel-chromium alloys, would meet a real need.

Casting Problems Are Many

FROM the foundry standpoint, the problems in connection with the production of this type of castings are many. It happens that much of the metallurgical development work has been done with reference to rolled products. An analysis is evolved which may or may not be suitable for castings, and often heat treatments are required which can only be applied to rolled products. Usually, too, the corrosion resisting qualities of the particular alloy have been determined by laboratory tests on forged or rolled samples. Whether or not these qualities exist in castings of the same analysis, or whether the alloy can be made to advantage in the foundry, is not considered.

However, the foundry is required to make it and must either take a chance of failure or work out the necessary variations in analysis and heat treatment to produce sound castings. It is then necessary to convince the user that such variations are to his advantage, often a difficult task.

After the metallurgical questions in connection with the alloy are settled (and this calls for more expert engineering judgment than is found in an ordinary foundry organization) the actual production of castings necessitates great care. Melting is done usually in arc-type electric furnaces, although induction furnaces are being used to some extent and in one plant, at least, these alloys are being made successfully in an open-hearth furnace.

Best to Pour on the Cold Side

The correct pouring temperatures are important and difficult to determine. Particularly in the case of the chromium alloys,



DIFFICULT Corrosion-Resisting Casting (27 Per Cent Chromium) for a Mine Pump for a Coal Mining Company (Right). At the top of this page is the pump in which the casting is incorporated

the metal while appearing very fluid, when hot, solidifies much faster than iron or steel and at the same time too high a pouring temperature causes large grains and consequent brittleness and porosity. It is advantageous to pour, as far as possible, on the cold side, remembering that too cold a stream will not fill out the molds.

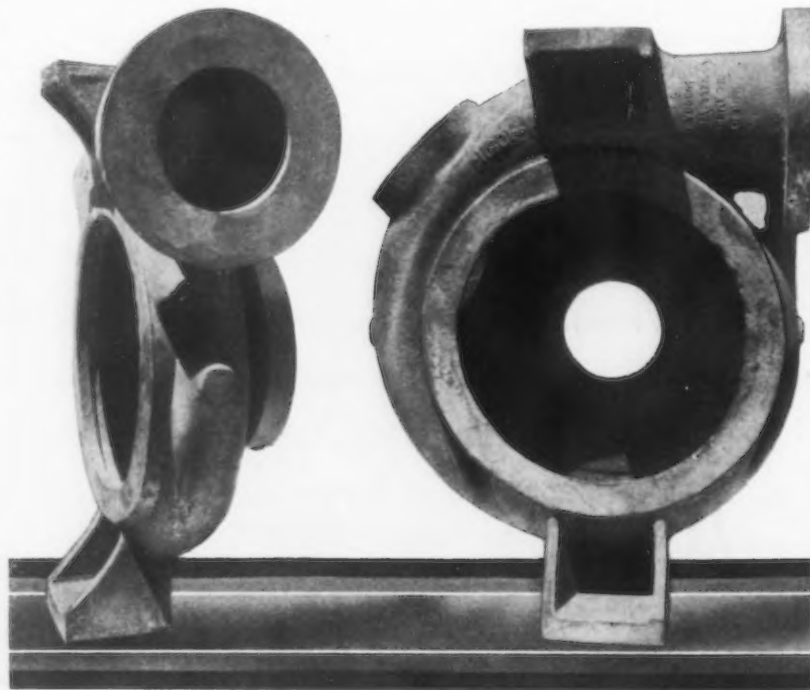
Difficulties from shrinkage, always present in a foundry, are intensified and the selection of sands, proper design of castings and correct location of gates and risers have to be carefully considered. Castings should be designed so there will be a minimum of shrinkage strains and no heavy sections so located that it is impossible to feed them as they freeze. Also the designer should keep in mind that these alloys are poor transmitters of heat. For this reason the

danger of shrinks and cracks from hot spots, is considerably increased, as the heat remains longer localized; in fact, the producer of these castings has to meet all the ordinary foundry problems plus many others peculiar to his specialty.

In spite of all these difficulties, castings are being made much better in quality than would have been thought possible a few years ago. Machining qualities have been greatly improved, proper methods of heat treatment have been evolved and many other improvements effected. It remains true, however, that castings of the same analysis might show a marked variation in quality, if made in different foundries.

Because of the severe conditions which these castings are usually called upon to meet, they should be subjected to a most rigid inspection at the foundry. In many cases they are an essential part of some important process and failure may involve not only considerable monetary expense but possible loss of life. An unusual responsibility rests on the foundry and many castings, which for ordinary service would be satisfactory, must be rejected.

Marketing of these castings requires a different kind of organization than is employed by the ordinary iron or steel foundry. For each application it is first necessary



to determine the proper analysis. This is often a difficult matter. The effect of various acids on different analyses, and the possible presence of sulphur gases must be considered, and the other factors which might cause failures must be given careful thought.

Because of the higher cost of such castings, much more is expected of them and the producer is wise to take every possible precaution against failure. It is also true that in many cases these castings replace iron or steel castings. Designs and patterns suitable for iron or steel are in use and it is often necessary to make drastic changes to meet foundry limitations or conditions peculiar to the job.

This all calls for expert engineering service. Many failures have resulted from ill considered recommendations as to analysis or acceptance of faulty design. This has a bad effect on the industry as a whole, but is felt most acutely by the producer responsible for the failure. He should, therefore, protect himself by maintaining an organization of men with sufficient technical background and practical experience to give weight to their recommendations.

The difficulty of making and marketing this type of casting, together with the cost of the alloying elements which enter into them, makes them considerably more expensive to produce. This higher cost can only be justified by a proportionately longer service life. The producer is often called upon to guarantee this longer life and has to make the choice between losing a sale and giving guarantees which, from several standpoints, are not very satisfactory. Contingent liabilities are established which are upsetting to the financial stability of the guarantor. Responsibility in case of failure is hard to fix; the producer has no control over operating conditions in his customer's plant and sometimes cannot even learn what the exact conditions were. Not even the pressure of competition can excuse many of the guarantees which are being made.

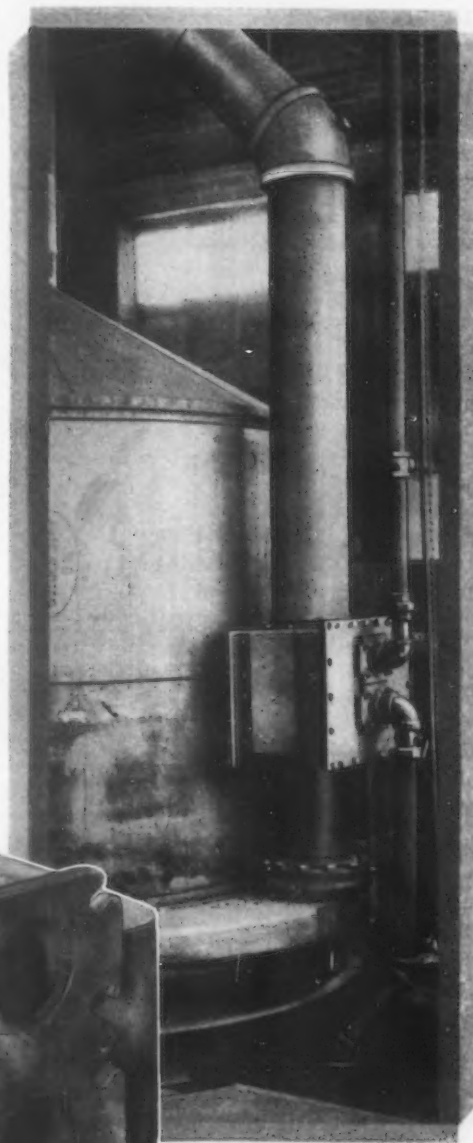
As stated above, the first important use of these alloys was for carburizing boxes. Manufacturers of automobiles and automobile parts are the largest users of carburizing boxes. The expansion in the automobile industry, which began about the time nickel-chromium carburizing boxes were first available, gave a large outlet to the foundries making them. To some extent, cyanide and lead pots were also made as well as floor plates, rails, etc., for heat-treating furnaces.

General Uses of Chrome-Iron Castings

DEVELOPMENT of chromium-iron alloys opened up the corrosion resisting field. The high chromium-iron alloys are almost completely resistant to nitric acid as well as to most of the organic acids. The chemical industry took advantage of this property, particularly in the construction of ammonia oxidation plants and for handling nitro-cellulose products. The total investment in chromium-iron and, more recently, in chromium-nickel alloys for this purpose, has been large. Most of this has been for rolled products, but a great many castings have been required. These have included pipe fittings, valves, manhole covers, connections and converters.

Castings to Resist Mine Waters

For many years a serious problem existed in the coal fields because of the presence of acid water in many mines. In some cases, the corroding action of this water was so extreme that so-called acid-resisting bronze pumps would fail after three or four weeks' service. It was found that these acid waters attacked the high chromium-iron alloys very slightly. Chromium-iron mine pumps, in service for several years, still show the original tool marks. It was necessary for the casting producers to cooperate closely



A WIDE Use for These Steel Castings Is in Recuperators Where High Temperatures Are Involved. A recuperator and how it is installed on a lead pot in the Willard Storage Battery Co.'s plant at Cleveland is shown



with the pump manufacturers in order to accommodate pump designs to the eccentricities of their alloys. But this has been fairly well worked out and several pump manufacturers have been supplying chromium-iron pumps on a real commercial basis for some years.

Other important applications of such alloys have been rabble arms and blades in zinc and copper ore roasting furnaces, as supporting members, tracks, carriers, etc., in enameling furnaces, skid bars, troughs and shoes in billet heating furnaces, saucer valves for open-hearth furnaces, recuperators and preheaters, and tube supports for oil cracking stills.

A recent development has been the making of apparatus for handling sulphite pulp in paper mills. This is almost entirely a corrosion problem and a chromium-nickel

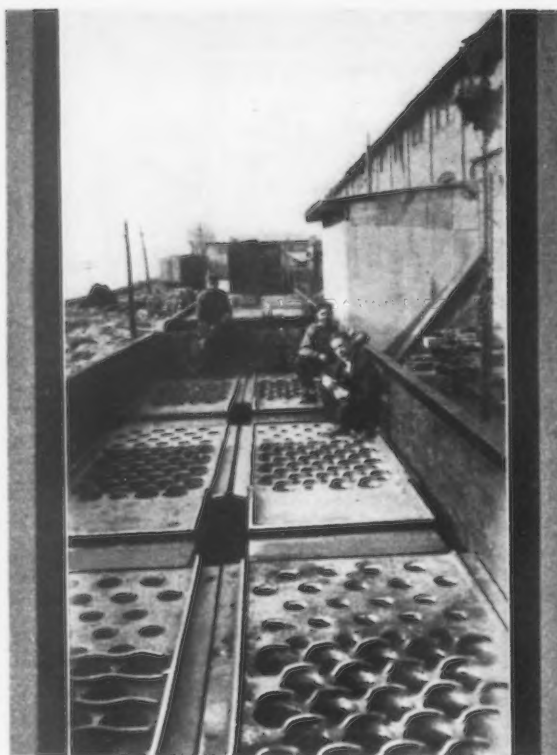
alloy has proved very satisfactory for the purpose. While rolled products constitute most of the equipment used, a considerable number of castings are also required.

Marine and building hardware, where the need for alloy castings is based on their resistance to atmospheric corrosion and to their preservation of a high polish, offers another use. These qualities suggest other possible applications, limited only by the present cost of the castings. Some of these alloys are remarkably resistant to abrasion and are replacing, to some extent, manganese steel and white iron. The advantage of a combination of abrasion and corrosion resistance is obvious.

Continuous Normalizing Units Need Such Castings

For normalizing steel sheets for automobile use, continuous furnaces of several different types have been developed. In the most generally used type the sheets are carried through the furnace on rollers or disks. These disks are mounted on shafts which are either water-cooled or dry, depending on the severity of the service. Disks and shafts are made from chromium-iron or chromium-nickel castings. As such furnaces have been built as long as 200 ft., it can be realized that a considerable tonnage of alloy castings is required for each one constructed.

Because of the pressure of production requirements most of these furnaces are being operated at higher temperatures than was originally intended. Operating temperatures between 1900 and 2000 deg. Fahr. are now common and impose a severe strain on the operating parts. Alloy castings have stood up remarkably well, considering



H EAT-RESISTING Castings (Below) Are Part of the Equipment in This Large Heat-Treating Furnace for Forgings. The supports for the forgings as well as the side plates of the car bottom are of these castings

S UPPORTING Beams or Plates of Heat and Corrosion-Resisting Castings for Oil Stills (Above)

the severity of the conditions.

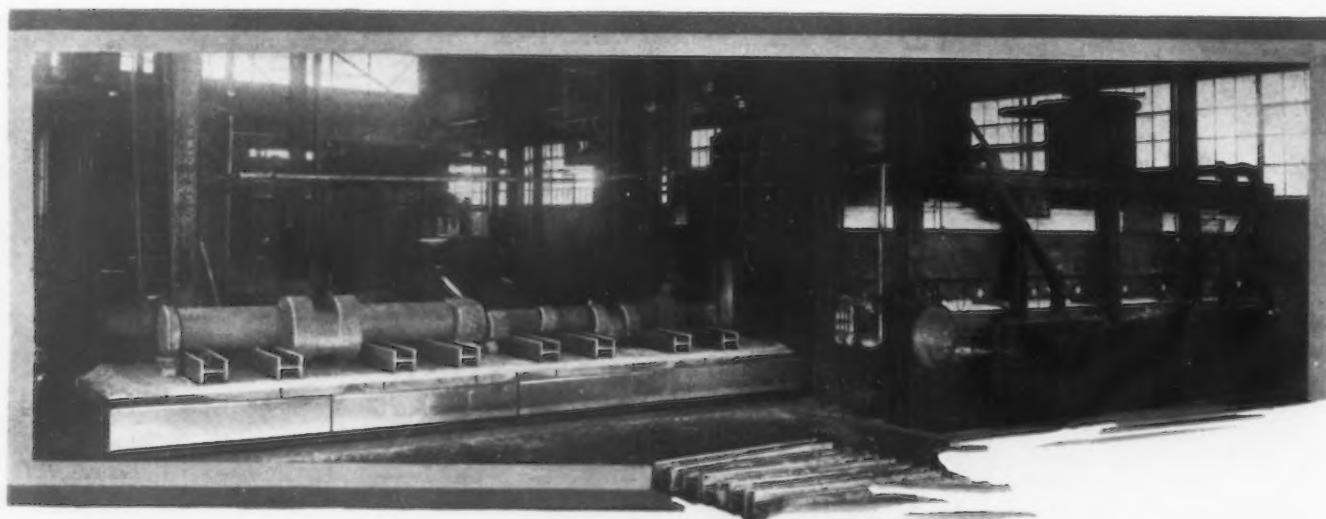
In fact, wherever temperatures run over from 1000 to 1200 deg. Fahr., and particularly where strength at these high temperatures is essential or where corrosion problems are involved, there is a very real need for alloy castings. Many important industrial developments have only been made possible by their availability.

To Solve Low Temperature Carbonization Problems

Processes and methods which tend to eliminate waste in industry are becoming more and more important. Many such processes have been theoretically possible for a long time, but their commercial development has been retarded because of the physical limitations of available materials. The production of these alloys has changed this situation and engineers are now able to proceed with such projects, in the knowledge that materials can be secured which will give satisfactory service at

high temperatures or against various acids. As a typical example, the possibility of low temperature carbonization of coal is a subject which has, for a long time, interested some of the leading engineers of the world. The advantage of distilling the gas from the coal at the mine, piping it to the consuming centers, and, at the same time, separating some of the other coal derivatives, is obvious, provided the initial and upkeep cost is not too high. While there are engineering problems in connection with these processes yet to be solved, their successful development depends essentially on the availability of alloys materials to stand up under the severe conditions involved.

(Concluded on page 1359)



Cast Iron Refuses to Step Aside

By O. W. POTTER*

CAST iron has run the gauntlet of the ages and has survived the combined efforts of innumerable alloys and materials to replace it and it still remains as one of the important engineering materials, in spite of the fact that there has been no concerted effort made by the foundrymen, heretofore, to combat the inroads of other materials in its field. Surely any material that can withstand the test of time in such a manner has some inherent qualities of immeasurable value.

The physical properties of any alloy are dependent on its structure, the various constituents present and their arrangement. The structure of cast iron is greatly influenced by the presence of silicon, manganese, carbon, phosphorus, sulphur, etc., and by the melting and cooling conditions. To vary the physical properties a thorough knowledge of these conditions is necessary, but in this brief discussion we can consider only some of the more important properties themselves.

Compressive Strength Great

FIRST let us consider the strength properties. The compressive strength is greater than that of any of the more common materials and alloys, ranging from 80,000 to 200,000 lb. per square inch, depending on its structure and chemical composition. Compare this with wrought iron at about 90,000 lb. per square inch and ordinary carbon steel at about 60,000 lb. per square inch. This makes cast iron useful where compressive stresses are great, such as in bases and beds for heavy machinery and columns, and for heavy bearings. This property is not considered as often as it might be, since most designs are figured with tensile strength as a basis. The tensile strength values as given in many handbooks and tables—15,000 to 25,000 lb. per square inch—is out of date and should be changed. Properly made cast iron for castings requiring strength will seldom run under 25,000 lb. per square inch and ranges up to and over 60,000 lb. per square inch, depending on its chemical composition and structure. Therefore, a new table needs to be drawn up, which will correlate strength with chemical composition and structure.

The properties of shearing and torsional strength are generally not considered at all in cast iron. Recently considerable work has been done on shearing tests and some European foundrymen believe it is a better indicator of casting properties than the transverse test, which is used so generally in this country.

Cast iron is classed as a brittle alloy with practically



no ductility or malleability. It is a fact, however, that gray cast iron in relatively thin sections can be punched readily without fracturing the casting. Experiments by Moldenke show gray cast iron to be somewhat plastic at high temperatures. The writer also recalls an instance in a stove job where a little slide draft was placed in a stove casting and, instead of using a bolt or rivet to hold the pieces together, a round pin was cast on one piece, the other slipped over it and the pin hammered to form a head, and the job was complete. This job caused some little comment at the time and the iron was called riveting cast iron. It has also been known for a long time that red hot cast iron can be sawed with an ordinary wood saw. These peculiar properties are

mentioned not because of their present value but because of their latent possibilities.

Has High Rigidity

THE property of rigidity is one that is often misunderstood. Rigidity is defined as "the property of a substance to resist change in shape, or the resistance to deformation." This property depends very much on the elasticity of a material. Cast iron has very little elasticity and therefore does not change its shape readily. Cast iron is condemned in many cases because of its brittleness and the fact that it breaks without warning, while the more ductile materials will distort considerably before rupture. This argument for the more ductile alloys is somewhat inadequate, since all materials must function below their elastic limit. If designers will study the stresses and the properties of the various materials a little more thoroughly, casting failures will be greatly reduced. Too many designers guess instead of figure, and, when a failure occurs, too many times they change the material to cover up their mistakes.

A good example of the rigidity of cast iron has just recently come to the writer's attention. Certain iron castings were replaced by built-up steel welded forms. Difficulty was first encountered in trying to machine this assembly accurately, because of its springiness. Then it was found that the welded forms were quite easily sprung out of shape in handling, which resulted in considerable difficulty throughout the whole operation, and it was found necessary to go back to iron castings in a number of cases. Built-up welded sections, no doubt, have distinct advantages for some work, but this is a case where they overstepped their field.

Has High Resistance to Corrosion

THE non-corrosive properties of cast iron have long been known, but they have become so commonplace that they have been frequently overlooked. Cast iron

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corrodes about one-half as fast as the ordinary steels, and only slightly faster than wrought iron. Cast iron pipe and fittings have stood the test of time and testify to the resistance of cast iron to the ordinary corrosive actions. Certain cast irons are quite resistant to both alkalis and acids and as a result are used extensively in the chemical industry. Recently cast iron has been used as exterior ornamental slabs on large buildings, replacing ornamental stone and terra-cotta. This is possible because of the non-corrosive properties of cast iron, along with the ease and perfect reproduction by which duplicate ornamental figures can be cast, as compared with the cutting and shaping of stone.

Considerable trouble has been encountered from time to time in many parts of the country from the corrosive action of sewage and sewer gases. In some places they have been known to seriously attack the tile, brick, concrete and steel, and cause disintegration so rapidly that failures have occurred, entailing no little expense and trouble. Cast iron has very adequately helped remedy this difficulty, and as a result cast iron liners for man-holes instead of brick, cast iron ladders instead of steel, and cast iron ducts instead of tile and concrete are being specified by a number of municipalities throughout the country. This development opens up a very promising field for cast iron.

Cast iron in silo door frames is proving to be the only material that will withstand the silage juices and fumes. In this field it is proving much more satisfactory than either steel or concrete. If it works so well for frames, why not make the whole silo out of cast iron? It could be made in sections in any desired height or diameter. It would be a permanent and fireproof construction and it could be dismantled and moved quite easily, and, when it had finally served its purpose, it would still have a nominal scrap value, which is not the case with present silo materials. Cast iron has also been used to a limited extent for culverts, and the only reason it has not been used more extensively is because of its bulkiness and frequent breakage in transit. With successes being obtained in the manufacture of centrifugal cast iron pipe, it appears that cast iron culverts may soon find quite general use.

Used in Holland Vehicular Tunnel

It would not be fair in this discussion of the properties and uses of cast iron if we did not mention its part in one of the greatest engineering feats of the age, the construction of the various tunnels under the Hudson River in New York. Cast iron was one of the most important construction materials used, because of its high compressive strength, its non-corrosive properties and its cheapness. In the Hudson River vehicular tunnel alone there were used 81,000 tons of cast iron segments.

Hardness Is Important Factor

LOW abrasiveness and hardness of white cast iron make it especially adaptable for carwheels, brakeshoes, chilled rolls, chilled plows, balls for ball mills and numerous parts for mining and crushing machinery. Alloy and heat-treated steels have made some inroads in this field, but cast iron still predominates.

Cementite is the hard constituent in white or chilled cast iron and it is the same constituent that is brought out in the hardened steels, but because of the higher carbon content of cast iron there is a greater concentration of this constituent, which makes it more resistant to abrasion. Cementite is the hardest of the ordinary iron-carbon constituents and is reported as 272 times as hard as pure iron (ferrite), as measured with a Jagger

*Metals and Common Alloys. S. L. Hoyt.

microsclerometer.* A comparative table of hardness is given as follows:

	Brinell No.
Chilled cast iron.....	445
White cast iron.....	418
Mild steel.....	120 to 160
Hard steel (quenched).....	275 and over
Alloy steels (heat treated).....	160 to 500

The table shows how favorably the hardness of white and chilled cast iron compares with that of the heat-treated high-carbon and alloy steels. This extreme hardness accounts for the high resistance to abrasion. The chilling property of cast iron is of particular value, because it makes it possible to harden parts of a casting and yet keep other parts soft enough to machine. To get this same effect in steel it is necessary to resort to a rather elaborate system of heat treatment.

Cast Iron Withstands Heat Well

THE heat-resisting properties of cast iron are very important. It has been shown by a number of investigators that the strength properties are unaffected by temperatures up to 800 deg. Fahr. Between 800 deg. Fahr. and the critical temperature (about 1360 deg. Fahr.) there is some change in structure but no great change in physical properties. When gray cast iron is subjected to repeated heatings and coolings and in the presence of certain gases, the very objectionable property of growth is exhibited. White cast iron does not exhibit this property and should be used where such conditions prevail. It is used with success for such castings as grates, stoker bars, annealing pots, and melting and heating pots and vats. Most other alloys when used under these conditions either melt, warp or corrode so rapidly that they soon become useless. A recent survey of the railroads of this country shows that practically all of the grates used in locomotives are cast iron, although some are experimenting with other alloys with the hopes of getting a longer-life grate. Thus far no other material has been found that gives the all-round satisfaction that cast iron does for this purpose. Some experiments have been tried with alloy cast irons and the results seem to indicate that still greater heat-resisting properties are possible. Cast iron demonstrates its ability to resist corrosive action and heat at the same time in such castings as burners for gas and oil stoves and the various parts of water heaters, heating stoves and furnaces.

Its Bearing Properties Are Superior

GRAY iron's bearing or anti-frictional properties are more valuable than is generally understood. Gray cast iron is probably the only alloy known that can function as a bearing without lubrication. This is a particularly valuable property when lubrication runs dry, as the casting will function for a considerable time without causing serious damage to the machine. There are two reasons for this, first, some of the graphite flakes break out and act as a lubricant, and, second, in the minute cavities formed when the graphite flakes break out, lubricating oil lodges and acts as a reserve when the lubricating system fails to function properly. Cast iron bearings have replaced non-ferrous bearings in numerous cases and have stood up very satisfactorily.

The high compressive strength of cast iron make it possible for use as bearings to carry heavy loads. Only recently has cast iron been employed in some cases instead of steel for tailstock spindles on machine tools. Steel spindles tend to score and freeze themselves in place, and continued hammering to loosen them soon spoils them. The points on the cast iron spindles stand up better too, because they do not burn themselves out so readily from excessive friction.

PROFESSOR POTTER presents a brief for an old material, one that "has run the gauntlet of the ages."

Cast iron, he finds, has many properties that commend it for certain uses in preference to other materials.

It has suffered mainly because of poor foundry practice and inadequate specifications.

He predicts that cast iron will now move forward, because of organized effort to study its properties, to classify castings, to set up specifications and to standardize and improve both product and methods.



O. W. Potter

The most important use of cast iron on account of this property is in cylinders of all kinds, and for pistons and piston rings. For castings of this type no material or alloy has yet been discovered, regardless of cost, that functions so satisfactorily as gray cast iron.

A special grade of gray cast iron, known as "gun iron," is being employed extensively for bearing parts on railroad equipment and heavy machinery. It is used in bushings, sleeves, cylinder liners, slide shoes, crosshead guides, gears, sheaves, etc. Because of the excellent bearing qualities and the uniformity of gun iron, users are paying considerably more for it than for the ordinary cast iron. Tests on alloy and low-carbon cast irons (high-test cast iron) also reveal improved wearing properties over the ordinary.

Freezes 150 Deg. Below Melting Temperature

THE relative ease of casting is an important consideration with all of the casting alloys. The melting and setting temperatures, shrinkage and fluidity are the most important factors influencing the ease with which an alloy can be cast.

The melting temperature of the average cast iron is approximately 350 deg. Fahr. lower than that for the average steel. This means easier melting, less chance for oxidation, a smaller amount of superheat necessary and less "burning in" and cutting of the mold. This ordinarily results in smoother castings and castings truer to pattern, as well as lower melting cost. Gray cast iron has a peculiar property that is exhibited by no other alloy—its melting temperature is higher (about 150 deg. Fahr.) than its freezing temperature. This is valuable from a casting standpoint, because it automatically provides about 150 deg. Fahr. of superheat. This greatly aids in the "pouring off" of the alloy and reduces the losses because of cold metal.

Shrinkage Is Low

CAST iron has the lowest shrinkage of any of the common alloys, as is shown in the table.

This property of low shrinkage greatly reduces the formation of shrinkage cavities and cracks, which are always serious problems in any casting job. Shrinkage cavities and cracks greatly reduce the strength of the casting, and the strength of the material is not the strength of the casting. Some sort of strength test on actual castings would be very desirable, and it would no doubt show that the lower the shrinkage the higher would be the ratio of the actual strength to the material strength.

Cast iron is generally very fluid, which is a favorable property to easy casting. High-phosphorus cast iron is especially fluid and, in addition, has the property of expanding slightly soon after it sets while the metal is yet in a more or less plastic condition, thus forcing the metal into the minutest cavities of the mold, giving a most perfect reproduction. This property is made use of in ornamental castings.

Another phenomenon that aids in the casting of intricate shapes is the property of cast iron to stretch when cooling from the molten condition. This is another evidence of the plasticity of cast iron at high temperatures, and it affords an automatic adjustment of casting strains due to shrinkage and contraction, thus preventing rupture and the formation of cracks. This property makes cast iron more adaptable to the casting of intricate shapes with varying metal thicknesses.

Gray Iron Easily Machined

EASE of machining is an important factor for all machinery parts that must be finished. Gray cast iron can be machined faster and at less cost than any other of our common alloys. Greater speed of machining is possible, less power is required, there is less tool wear and accuracy of finish is easy to obtain. Then, in addition to low machining costs, it requires less machinery investment, reduces the pro rata floor space required and makes the machine shop generally more flexible.

The annealing of cast iron facilitates machining; it often cuts the machining time in half and greatly reduces tool wear.

The machinist has always been interested in soft cast iron, and it has been the practice too often to sacrifice strength in order to obtain high machining speeds. In Europe more attention has been given to the strength

Comparative Shrinkage of Materials

	Shrinkage Per Foot in 64ths of an Inch
Heavy gray cast iron.....	6
Average gray cast iron.....	8
White cast iron.....	12 to 16
Cast steel.....	16 to 20
Aluminum.....	14
Copper.....	14
Brass.....	12 to 14
Zinc, lead and tin.....	12

properties, while the machinability is more or less a secondary consideration.

Endurance Limit Not Uniformly Low

CAST iron's resistance to shock and impact and its fatigue properties have generally been taken for granted as being very poor. It is only very recently that any actual research of any magnitude has been attempted to determine these properties. Work done by Prof. H. F. Moore at the University of Illinois, and by Prof. J. B. Kommers at the University of Wisconsin has given us the first real data as to these properties.

Some very unexpected results have been found in these investigations. Kommers says in discussing some of his tests*: "The fact that series J, which gave the lowest values of the present series, had an endurance limit of 11,800 lb. per square inch, and that series K gave a value of 24,100 lb. per square inch indicates that cast iron need not be looked upon as a uniformly low-strength material. The strength of cast iron can evidently be controlled in a similar manner at least to that of steel." According to Moore's tests, cast iron exhibits a marked increase in endurance limit with repeated stresses, which is not generally the case with brittle materials.

Both reports show that the notch effect in cast iron is practically nil, while in steel any kind of a notch greatly reduces the strength. This means that irregularities in shape, machining marks, mars, nicks, etc., have practically no effect on the impact and fatigue strength of cast iron. This is a very desirable condition for any material working under stress. Other investigations have also shown that these properties can be greatly improved by proper heat treatment.

Segregation Can Be Largely Overcome

SEGREGATION is a property of cast iron that has done much to give it the reputation of being a very unhomogeneous material. This is due to the many different elements and constituents and, while it cannot be eliminated entirely, it can be controlled and reduced to a minimum by fixing the chemical composition and by establishing a uniform melting practice. It has also been found that this condition can be greatly reduced by the addition of certain alloys and by heat treatment, so that with a knowledge of conditions and careful practice, this objectionable property is not a serious handicap.

The unit cost of castings is always a vital factor. The cost of cast iron parts is the lowest of any of the cast parts, but just because a commodity is cheap is no indication that it is inferior in quality. This false idea of values often robs it of a part of its rightful field.

Heat Treating and Alloying Offer Great Possibilities

USE of alloy steels and heat treatment have brought about many new properties in steel that have been a great boon to our mechanical and metallurgical development. Metallurgists agree that cast iron is essentially a steel with an excess of carbon. Experiments have shown conclusively that alloy additions and heat treatment offer great possibilities for improving cast iron. Nickel and chromium are being used with gratifying results, but the field has hardly been scratched and more attention should be given these possibilities by both the foundryman and the casting user.

A concrete example of what can be done with alloys in cast iron was demonstrated on a job during the war, when very little was known about the effects of alloy additions. A certain shell forging plant was having considerable difficulty with die liners for the forge presses. Steel liners warped and jammed in the presses and pro-

duced shell blanks that were out of shape. Cast iron liners solved the problem of warpage and distortion, but at the start considerable difficulty was encountered because of breakage. After some experimenting, a chromium low-carbon cast iron (semi-steel) was produced that gave very good satisfaction, producing consistently a thousand shells before replacement was necessary. Today, with a much greater knowledge of alloys, why are they not used more?

Cast iron, like all materials, has a number of undesirable properties, some of which have already been mentioned, which prevent its use for certain types of work. Its low-tensile strength, as compared to that of the steels, along with its brittleness, prevents its use where high-tensile stresses are produced and where excessive shocks and vibratory stresses prevail.

There are many conditions, however, where the stresses are not great enough to exclude cast iron and both the casting user and the foundryman have been at fault in not applying the proper specifications to give the desired properties for the job. As a matter of fact, a large part of the tonnage of cast iron has been made in the past without any definite specifications at all. If it was to be machined it had to be soft, and the softer the better, but, if it was not to be machined, any old thing would do. Instead of discarding cast iron we should study its latent possibilities a little more diligently.

How Cast Iron Can Hold Its Place

FOUNDRYMEN must learn to pick their field and stay in it. The idea of making everything from a toothpick to a locomotive in the same shop is all wrong. One cannot make heavy and light work, hard iron, soft iron, stove plate, ornamental iron and cylinder iron all under the same roof and out of the same cupola and expect to get the best results. This has been one of the great mistakes of the foundry industry. In Europe, it is rather common practice to have a separate cupola for the different kinds of iron, and that principle is right. If the foundryman will stick to his field, study the properties desired and how to control them, and constantly strive to improve these properties, and furnish a uniform and reliable cast iron, he will automatically enlarge his market, improve the reputation of cast iron and more firmly entrench it against the inroads of substitutes.

The designer and the buyer, on the other hand, have frequently been unfair to cast iron. Many times have we seen cast iron, malleable, steel and even non-ferrous castings made from the same pattern, showing clearly that the designer didn't take into consideration the different properties of these various materials. Up until a few years ago mechanical engineers were not required to study metallurgy and, therefore, did not know very much about the properties of the engineering materials. What is needed is more complete cooperation on the part of the casting user, engineer and the foundryman in determining the true properties of cast iron and in setting up proper specifications for the various castings.

The foundrymen have already realized this need by organizing the Gray Iron Institute, through which they are going to study the properties of cast iron, classify castings, set up specifications and work for standardization and improvement of properties and practice. Through this organization they will put cast iron into uses where it rightfully belongs and take it out of places where it does not belong, and thus assure the casting user of a better and more reliable product. This move on the part of the foundrymen is already showing results and the future holds out great promise.

Cast iron not only refuses to step aside, but it is already stepping forward.

*"The Static and Fatigue Properties of Some Cast Iron," by J. B. Kommers, A.S.T.M., 1928

Modern Plant for Malleable Castings

Annealing Done in Tunnel Kiln — Producer Gas from Hard Coal



Air Furnace Is Fired Alternately with Oil and Coal

A FEW historical facts are necessary by way of introducing the following story describing

a most interesting malleable iron foundry. Prior to 1917, L. R. Zifferer, inventor of new types of expansion bolts, trading as the United States Expansion Bolt Co., with offices and assembling plant in New York, purchased his malleable castings from a small foundry located in Columbia, Pa., then owned and operated by George P. Cooper & Co. Mr. Zifferer's requirements for malleables grew rapidly and the source of supply became inadequate. It was during the dark days of the world war and all foundries were operating at maximum capacity, making it extremely difficult to place patterns with another foundry, to mention nothing of the exorbitant prices asked.

Why a New Plant Was Needed

TO continue in business, Mr. Zifferer had one alternative—that of owning and operating his own malleable foundry. In a relatively short time, this was accomplished by taking over the Cooper plant at Columbia, and incorporating under the name of the Columbia Malleable Castings Corporation. Immediate action was taken to scrap the antiquated equipment to put into effect what was then modern foundry practice by the purchase of new equipment, employment of skilled assistants and adding to the facilities in general for the manufacture of more and better malleable castings.

After plant operations were going along smoothly, the inventive mind of Mr. Zifferer again became active and a type of distinctively new pipe hangers was developed and found immediate acceptance with the automatic sprinkler industry, greatly increasing the business and necessitating a larger plant. Additions were built intermittently as required, until all available ground was used. Further

demands were made for increased capacity, resulting in the purchase of a large tract of land along the

Lincoln Highway, just east of Columbia, for expansion purposes.

Architectural and Landscape Beauty Combined

STANDING as a monument to his efforts, the layout and detail of all buildings and equipment were under the personal supervision of Mr. Zifferer. Combining unusual architectural and landscape beauty with modern design and equipment of a malleable iron foundry, the new home of the Columbia Malleable Castings Corporation has attracted much favorable comment.

Approaching the plant from either direction on the Lincoln Highway, the traveler is attracted first by a life-size portrait of a molder pouring a mold. At night these signs are so illuminated that the molten metal is pictured as running from the ladle into the mold in a notable approach to a veritable reality.

The buildings, which are faced with full range red tapestry brick, laid in Flemish bond and trimmed with Indiana limestone, are set back several hundred feet from the highway. The entrance from the highway consists of broad curbed driveways, encircling a court, which is flanked on either side by a large lawn, decorated with boxwood, flowers and fine shrubbery. The general appearance is more that of a country club than a foundry, the latter usually being regarded as about the least attractive of all industrial plants.

General Plant Resembles an E

THE general arrangement of the buildings consists of three parallel wings or bays, as shown by a plan drawing, connected in such a manner as to give straight



Architecturally the New Plant of the Columbia Malleable Castings Corporation, With Its Landscape Gardening, Surrounding Its Approaches, Presents an Imposing Appearance from the Lincoln Highway. Illuminated signs (above) add to the attractiveness of the front lawn

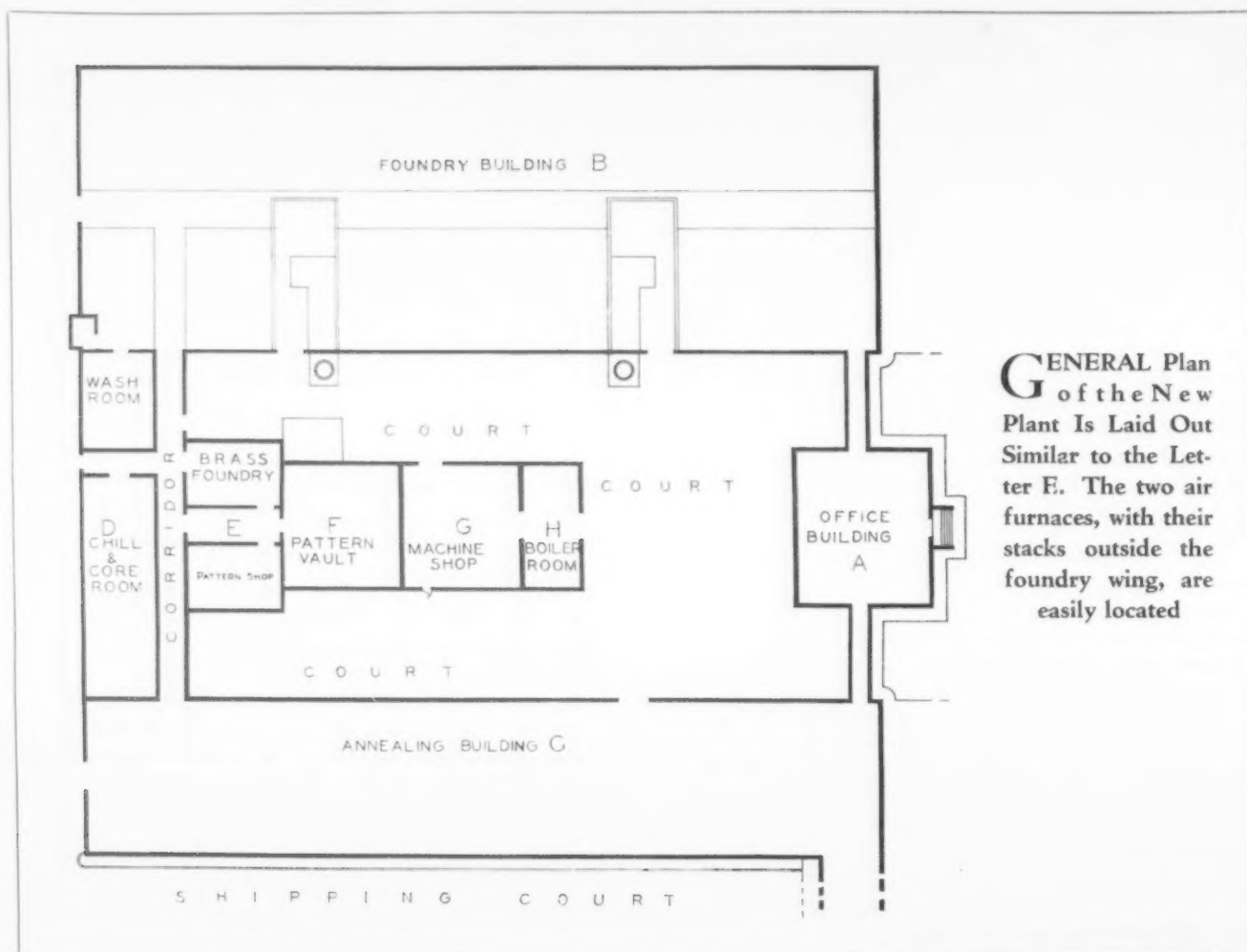
line flow of production from raw materials to finished product. The molding bay, comprising about 35,000 sq. ft. of floor space, is of double monitor construction to give good lighting and ventilation. This bay is traversed longitudinally by an 8-ft. concrete gangway with clay molding floors on either side. Other bays are of similar monitor construction but have high roofs and are well ventilated and lighted by large windows.

The interior of all buildings is painted with aluminum so as to give maximum reflection of light. All departments of the plant are equipped with white enamel Frigidaire water coolers and sanitary drinking fountains. The entire plant is heated by Thermoliers, industrial heating apparatus, furnished by the Grinnell Co., Providence, R. I., these being thermostatically controlled to keep the tem-

perature in all buildings constant at all times. Each thermolier is equipped with a motor and fan which serves to keep the air in constant motion. Steam for heating is supplied by two 170-hp. twin tubular boilers, fired by oil, with a total capacity of 11,000,000 B.t.u. per hr. These were furnished by the Smith Twin Tubular Boiler Co., Philadelphia.

Melting Done in Two Air Furnaces

Two air furnaces each have a hearth about 30 ft. long by 7 ft. wide. The melting time for a 25-ton heat is from



GENERAL Plan
of the New
Plant Is Laid Out
Similar to the Let-
ter E. The two air
furnaces, with their
stacks outside the
foundry wing, are
easily located

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Equipment Most Up-to-Date Available

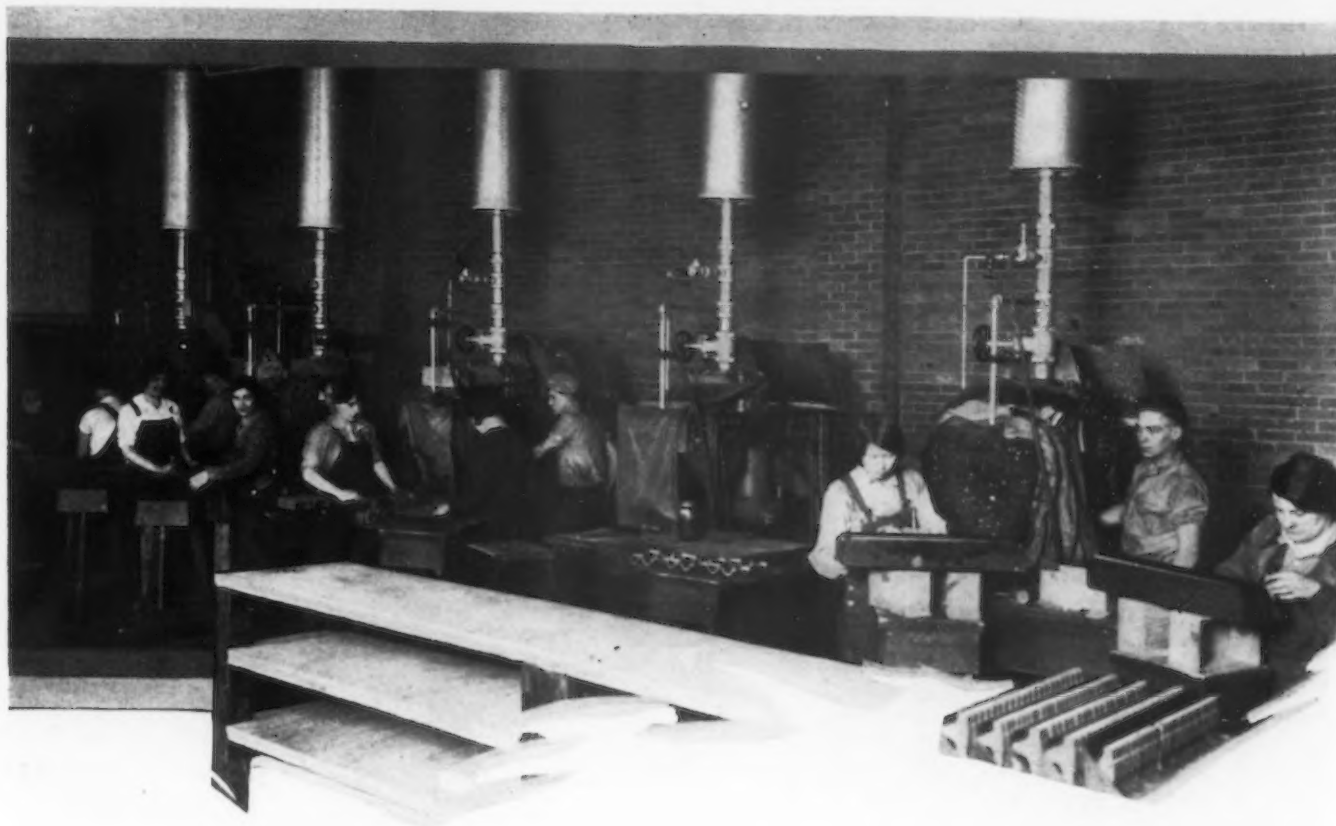
IN the way of foundry equipment, the policy of the company has been toward standardization on the most up-to-date and approved apparatus available. While the management has not seen fit to adopt conveyors and continuous molding, it is apparent that no care and expense have been spared in procuring high-class equipment for all departments.

The cost of electric power being prohibitive, the present melting equipment consists of two 25-ton reverberatory

6 to 7 hr. No effort is made to speed up this melting rate, as only one heat per day is cast from each furnace and it is the contention of the management that a faster melting rate from this type of furnace is not desirable for economical as well as metallurgical reasons. The charge consists of from 25 to 30 per cent pig; from 5 to 10 per cent steel and the balance remelt, sprue, gates, etc.

Only pig iron made from an all-ore charge in the blast furnace is used, as small traces of certain alloys used in steel and high-test cast iron may seriously affect the annealing of malleable castings. Likewise, only steel rail ends, of a known source, are used for steel scrap. A small amount of charcoal pig is used to adjust analyses and to give a better and more uniform quality of product.

The coal used in the unit pulverizer for melting is mechanically cleaned and screened. This comes from the Worden mine of the Pittsburgh Coal Co., and is one of the



highest quality bituminous coals available. A coal drier is not used, and the coal is stored under cover to prevent excessive moisture.

Molding Done by Jolt Squeeze Machines

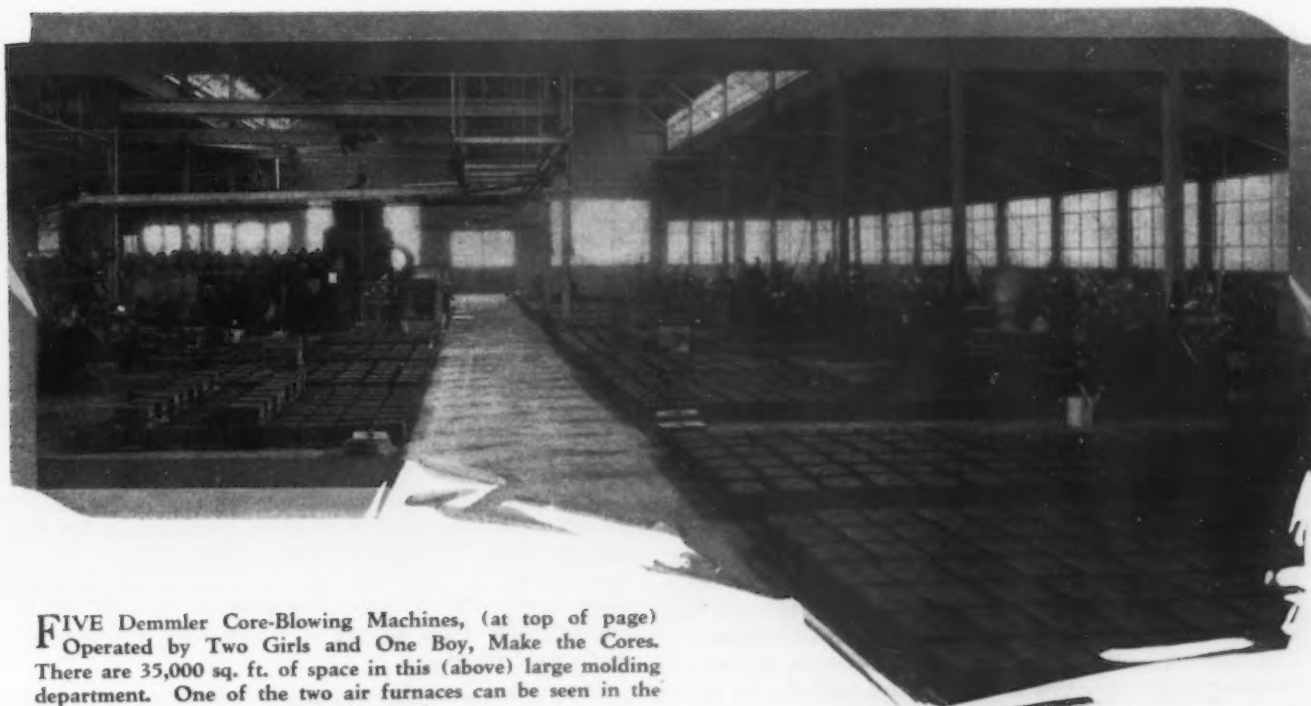
THE molding department will accommodate about 90 molders. This is equipped with Osborn jolt squeeze molding machines for small and medium work roll-over and jolt-squeeze-strip molding machines for heavy work. The metal is handled from the furnace to the molders in 600-lb. ladles, transported on a hand power trolley operated on American monorail track. At the molding floor the metal is transferred to hand ladles for pouring into molds except

the larger castings which will be poured by bridge trolley ladle direct. Only solid metal slip flasks and cast metal jackets are used. Each molder's bench is equipped with an adjustable electric light socket, which permits proper lighting on any part of the mold.

Cores Made by Blowing Machines

The core room is equipped with a No. 2 Simpson sand mixer; five No. 2 Demmler core-blowing machines, several International jolt machines, five sections of Coleman core ovens, gas-fired, and suitable racks, trays, trucks, etc., for handling cores.

Castings are handled from the molding floors to the



FIVE Demmler Core-Blowing Machines, (at top of page) Operated by Two Girls and One Boy, Make the Cores. There are 35,000 sq. ft. of space in this (above) large molding department. One of the two air furnaces can be seen in the left background

cleaning department by Yale lift trucks and in specially designed dump buggies, which may be dumped directly into the sand blast machines without rehandling of the castings. These buggies are also used for unloading castings from the sand blast machines, from which they are taken by the lift truck to the inspection and chipping benches, and automatically dumped.

Present sand blast equipment consists of two tumblast machines, furnished by the American Foundry Equipment Co., and one large barrel furnished by the W. W. Sly Mfg. Co. All castings are steel blasted both before and after annealing. From the inspection bench the castings pass to the grinders for removal of the gates. Present grinding equipment consists of four high-speed grinding machines, furnished by Safety Grinding Wheel & Machine Co.

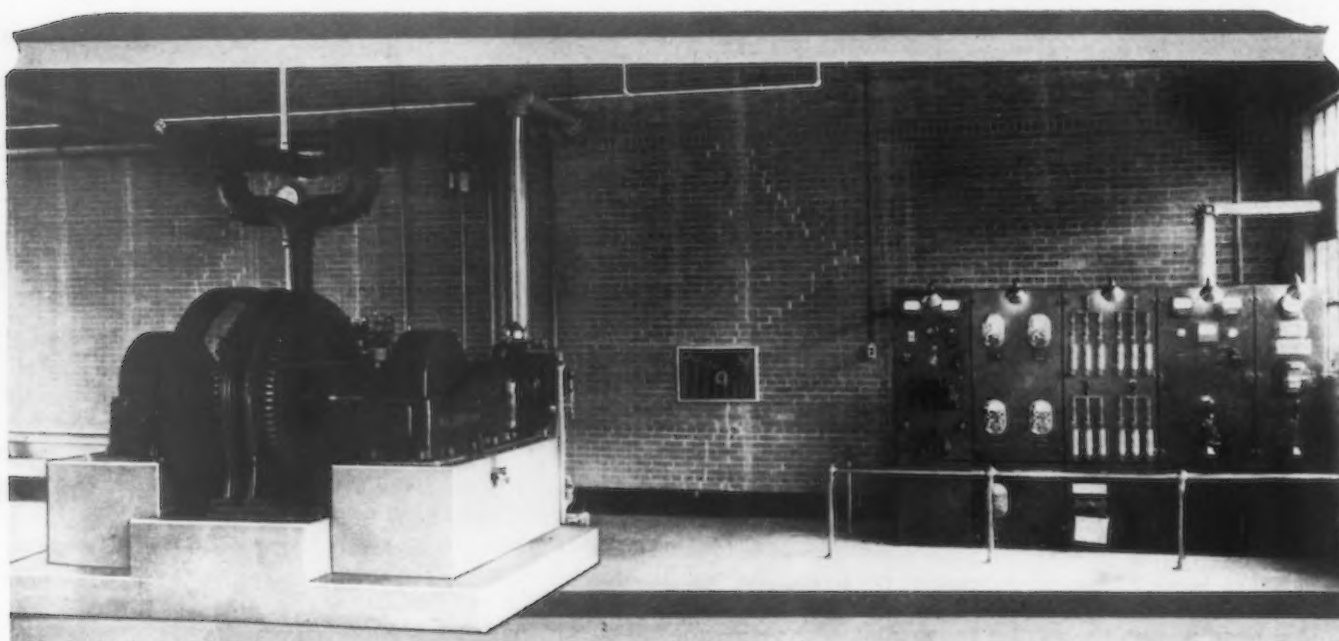
From the grinders the castings pass to the annealing

of the oven, the temperature is allowed to drop from 1700 to about 1400 deg. Fahr., quite rapidly. In the third, or final cooling zone, the temperature is held around 1400 deg. for some 20 hr. by use of auxiliary burners, after which it again drops quite suddenly to about 1000 deg. Fahr., when the car is removed from the oven.

This tunnel type annealing kiln is fired with gas, made from buckwheat size anthracite coal which is fed mechanically into the Dover-Galusha gas producer. The gas is washed before delivering to the burners and has a B.t.u. value of about 160. This same gas is used for firing the core ovens.

Features of Annealing Process

Outstanding features of the tunnel type kiln is the accuracy to which temperatures, both heating and cooling, may be controlled, resulting not only from the effi-



WHERE Power, Both Electric and Pneumatic, Is Generated. There is so little vibration in the foundation of the air engine that a coin will stand balanced on its edge on the concrete. Two large twin tubular boilers supply the steam

department to be packed into pots for annealing. These pots are 25 in. x 21 in. x 18 in. and hold approximately 500 lb. of castings each. Quartz gravel is used for packing material and this is jarred down in the pots by use of a Branford air vibrator. The pots are stacked three high on a car, each car holding six stands, making 18 pots or about 9000 lb. of castings per car.

Annealing in a Tunnel Kiln

THESE cars when loaded are pushed into a Dressler tunnel type annealing oven by a 100-ton hydraulic ram. The oven, which is 182 ft. long, holds 22 cars. When a loaded car is pushed in, a finished car is pushed out at the opposite end of the oven. When the oven is operating at capacity, a car is pushed in about 5½ hr., making the complete cycle per car about 120 hr. This gives an annealing capacity of about 20 tons of castings every 24 hr.

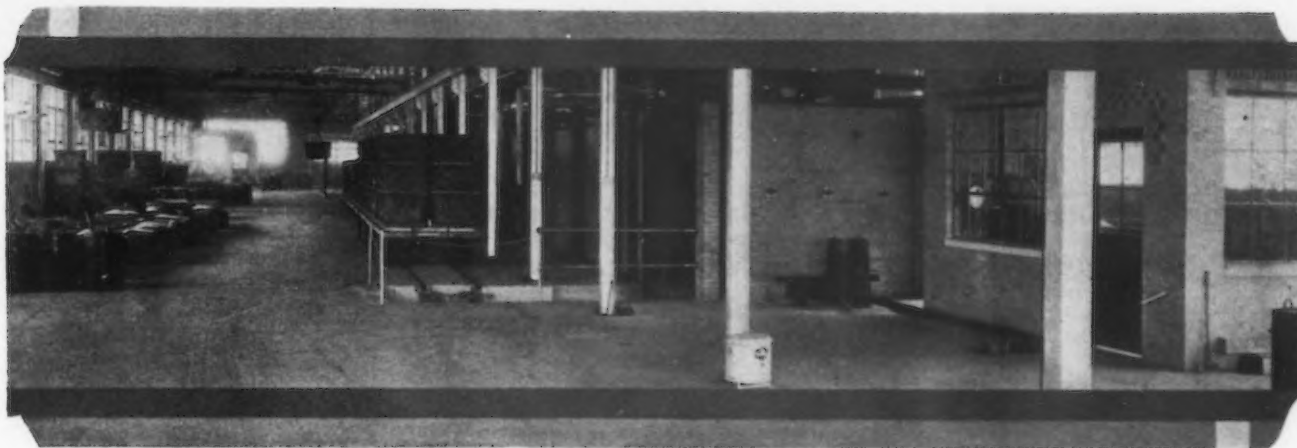
There are three zones of heat treating in the Dressler tunnel type kiln. In the first, or heating zone, the temperature is maintained at about 1700 deg. Fahr., when the oven is operated at capacity. In the second, or intermediate cooling zone, which is cooled by omission of insulation and the construction of special flues, built in the sides

of the oven, the temperature is allowed to drop from 1700 to about 1400 deg. Fahr., quite rapidly. In the third, or final cooling zone, the temperature is held around 1400 deg. for some 20 hr. by use of auxiliary burners, after which it again drops quite suddenly to about 1000 deg. Fahr., when the car is removed from the oven. This protection from oxidation and the fine control of cooling through the critical range produces malleable castings free from skin hardness and of excellent machining properties without sacrifice of strength and ductility. In the threading of malleable castings, this is very important.

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An important detail too often overlooked in the building of a foundry is a safe and adequate provision for the storage protection of patterns against loss by fire. This has been taken care of by the construction of a fireproof pattern vault, with 13-in. concrete walls, located on the ground floor of the pattern shop and fully equipped with Lyon steel shelving.

The plant also includes a small non-ferrous foundry,



with modern melting and molding equipment for the production of metal patterns, special castings, etc.

Adequate Provision for Safety and Health

TO protect the health and well-being of all employees, a first-aid room has been equipped with the finest facilities available for rendering first aid and medical attention to injured employees. A trained nurse is on full-time duty in the first-aid room and a physician makes daily calls to render any medical attention necessary.

To further protect the health of employees, and especially the molders, a modernly equipped washroom has been provided, with individual steel lockers, shower baths and steam-heated drying racks so that molders may always have dry clothing when commencing the day's work.

A cafeteria has been provided, where employees are served at a nominal cost to them. The cafeteria is so arranged that employees may enter from any department of the plant without being exposed to the weather. To encourage athletics and clean sports for employees, the company has provided a baseball diamond, tennis court, ground for quoits, and also supports a basket ball team.

What the Company Produces

The principal product of the plant consists of a complete line of malleable pipe fittings, pipe hangers and expansion bolts, although some jobbing work is done.

The Columbia Malleable Castings Corporation has active membership in the Malleable Iron Research Institute and the tensile properties of its product are as follows:

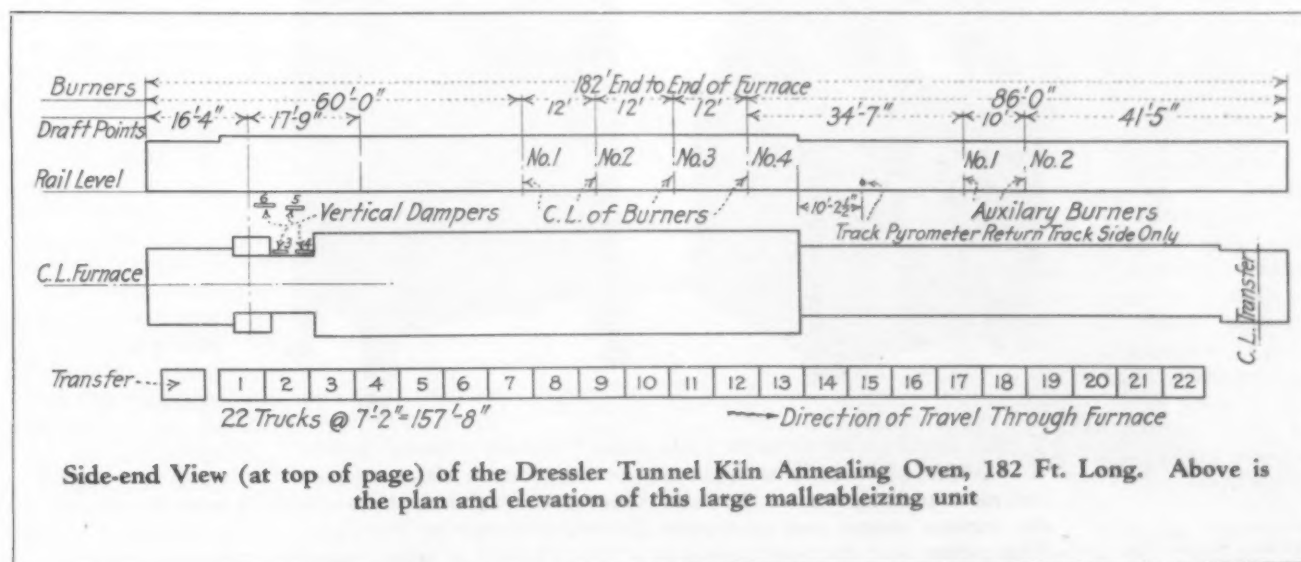
Ultimate tensile strength 54,000 to 56,000 lb. per sq. in. yield point, 36,000 to 38,000 lb. per sq. in.; elongation in 2 in., 18 to 25 per cent.

Personnel of the Organization

WHEN the construction of the plant was well under way, Mr. Zifferer's attention was next turned to securing the best talent available to assist him in building up an operating organization that would be in keeping with the general layout and equipment of the new plant. His choice ended in the selection of J. B. Deisher as plant manager. Mr. Deisher, who is a practical foundryman, is internationally known in the malleable industry, having been associated for a number of years with the Malleable Iron Research Institute as shop practice engineer. In 1927 he was sent to Europe by the American Radiator Co., as foundry expert and consulting engineer. Mr. Deisher has at various times contributed, to the technical press, articles on malleable cast iron and at present represents the malleable division of the American Foundryman's Association on the ferrous advisory committee to the United States Bureau of Standards in Washington. His wide experience in the malleable industry, combined with the creative aggressiveness of its president, should make the product of this new plant stand out as a credit to the industry.

Officers of the Organization

Associated with L. R. Zifferer, as president, and J. B. Deisher, as plant manager, is H. Nelson Albright, vice-president and treasurer. Mr. Albright has been associated with Mr. Zifferer as an officer of the Columbia Malleable Castings Corporation for several years.



X-Raying Prevents Foundry Losses

Examples of Defects Found in Iron and Non-Ferrous Castings—Three Ways of Getting Results—How X-Rays Are Applied

BY WILBUR S. WERNER*

VITAL interest is being manifested by the iron industries in the adaptation of X-ray as a tool of research for the improvement of methods and materials and for the reduction of production costs. This article is not a discussion of an individual problem but is presented to advise the permissible possibilities of industrial X-ray application.

The X-ray, which has long been the physician's most reliable instrument in diagnosis, now holds forth to the industrialist even more extensive and valuable assistance. In fact, although we have employed it in many and various fields, we have only begun to realize a few of its manifold uses.

How X-Rays Are Produced

THE nature and source of X-rays will be briefly discussed. For a time after their discovery in 1895 their true nature was shrouded in considerable mystery and for that reason the algebraic term X was used for their terminology. Science has since classified this form of radiant energy as Roentgen rays in honor of the discoverer. The term X, however, is more or less conventionally used today an account of its ease of expression.

X-rays are no longer mysterious. Scientific research has definitely proved that these rays are essentially a form of light having the characteristics of visible light, yet invisible and capable of penetrating solid substances. They are a form of radiant energy propagated as electromagnetic vibrations through space, their wave lengths being only one-ten thousandth as great, on an average, as that of visible light.

These rays are excited by electronic bombardment of the various suitable elements, the impact of the electrons causing X-ray emission. Conventionally a tube is used having as a cathode a heated filament for electronic emis-

sion, an anode or target on which the electronic stream is focused when a high potential current is applied to the tube terminals. The characteristics of the rays produced are dependent upon the kind of target selected and their penetrating power upon the potential of voltage applied to the tube.

Industry has made use of this wonderful tool not only to examine gross structure but also to delve into the ultimate structure of matter. This type of study has frequently resulted in findings which have occasioned revolutionary improvement of materials manufactured to enhance the convenience of man's daily life.

Three Methods of Examination

THREE terms are applied to the several manners of gross structure examination:—radiography, fluoroscopy, and ionization. The extent to which X-rays are absorbed by matter is dependent principally on its thickness and density. Therefore, when these rays are projected upon an object of irregular density, backed up by a photographic film, a shadow picture will result which reveals, due to this differential absorption, any irregularities or defect in the piece examined.

The "film" or radiographic method is preferred for most metal examinations because: First, the film presents more minute detail than other methods; second, the heavier metals such as iron, copper, tin, and their alloys, necessitate a length of exposure which is cumulative on the film and which would not be of sufficient brilliance on a fluorescent screen for the eye to distinguish; third, the film gives a permanent record for comparison.



FIG. 1.—Type of General Equipment Used for General Radiographic Work. The high-voltage transformer with mechanical rectifier is shown on the left. The control cabinet, including the various meters and protective devices, is shown on the right. This cabinet is of the type known as a "dead front" or safety panel.

*Secretary Kelley-Koett Mfg. Co., Inc., Covington, Ky.

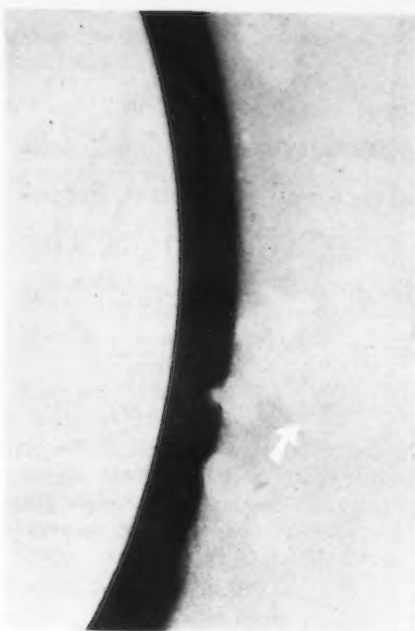


FIG. 2. Section of Gray Iron Casting of About One Inch Thickness. The arrow indicates the major defects, blow-holes

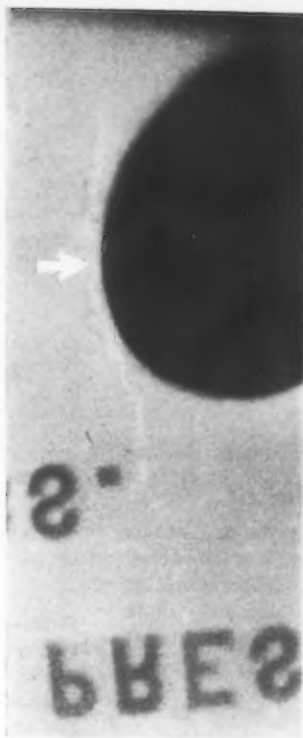


Fig. 3. Portion of a Brass Casting Showing an Internal Crack Indicated by Arrow. (at Left)



Fig. 4. Portion of Steel Casting of Approximately 2 in. Thickness Showing Included Core Wires. Arrows indicate the wires. (Above)

Radiographic methods have proved of special value in the examination of metal castings for the presence of internal gas cavities, porosity, sand and slag inclusions, included core wires, cracks, and metal segregation.

THE generally accepted practice is to ray "pilot" castings from the mold and, if indicated, to correct immediately any mold or pouring difficulty presented. Oftentimes, however, when castings will be subject to exceptional stress or when they are to undergo expensive machining, each casting from the pour will be individually rayed.

Reproductions of radiographs here shown are not of an unusual or startling nature. Instead of this type of film the writer has tried to include examples of the main problems submitted by foundrymen who are casting the heavier metals.

Perhaps one of the most exasperating occasions for both foundry and machine shop is the discovery of porosity in a casting when the machining has been nearly completed. The customary procedure is for the foundry to replace the casting. However, the shop loses the machining cost. This results in a mutual loss.

In cases where the labor cost is many times the cost of the casting, an occurrence of this nature can go far to reduce profits and to cause friction between shop and foundry. In many instances of this nature the radiograph once used has proved almost indispensable.

SOME examples of radiographs are shown. These are direct reproductions of the X-ray film, the denser portions of the casting show up as the lighter areas on the film and the lighter portions of the casting naturally show up as darker areas. Fig. 2 shows a portion of a gray iron casting which reveals a number of gas cavities. These are not visible on the outside and would probably not have been revealed until the machining was half completed. The labor cost on this particular piece is about ten times the cost of the casting. The practicability of radiographic inspection in this case is readily apparent.

Another type of defect which the radiograph reveals is shown in Fig. 3. It is a portion of a brass casting 1 in. thick showing a crack of considerable length. The value of revealing these internal cracks is evident.

Fig. 4 shows a portion of a steel casting 2 in. thick showing included core wires, indicated by arrows.

Fig. 5 is a radiograph of a steel casting for a high-pressure valve fitting. A line of gas cavities which weaken the wall to such an extent that this fitting would be unsafe can be seen, as well as a line of lesser cavities.

It is interesting to note that this is one of the "pilot" castings on an experimental pour. On this pour different arrangements of gates, risers, and vents were tried. From the radiographic data gained, foundry practice was adjusted until the products were nearly 100 per cent flawless.

(To be Concluded)

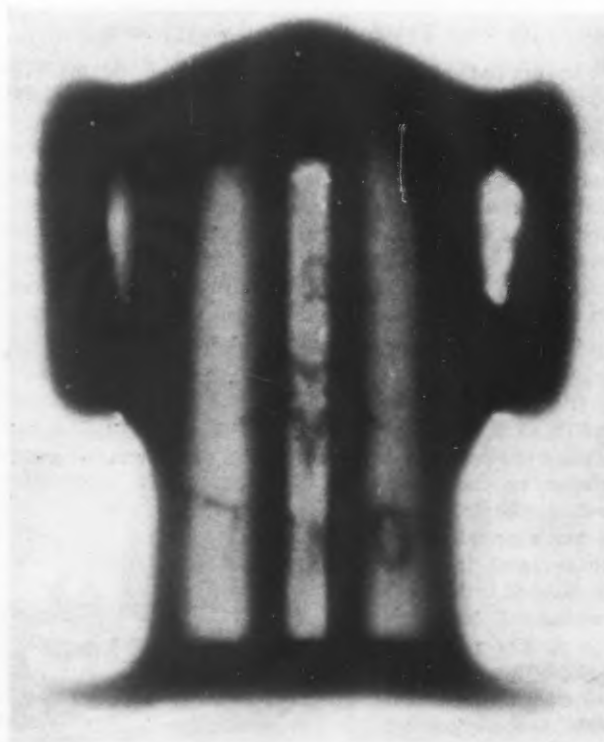


Fig. 5. Radiograph of Steel Casting for High-Pressure Valve Fitting

Long-Life Molds and Their Uses

Combination of Metal and Refractory Mold Most Promising—Two Effects of Hot Metal on Sand or Metal Molds

DESTRUCTION of the sand mold when making castings has always been considered one of the inefficient procedures of foundry operation. When only one casting is made from a given pattern, there is no other recourse, and usually the pattern cost is higher than that of the casting made from it. When quantity production, however, is carried out, the pattern cost drops fast but that of the mold remains. It was but natural that inventive genius became interested early in the game. Thus the search for the "permanent" mold is ancient foundry history.

Most Metal Containers Break Down Finally

From the nature of the case, there is no material of construction known which, serving as a container for molten metal again and again will not eventually break down through this contact under the extremely high temperature conditions existing. Even in the die-casting of aluminum, with lower temperatures of superheat involved, by the time 100,000 light castings have been made, firecracks will have spoiled even the best of steel molds for further use—the castings becoming unsightly. Most foundrymen have had experience with iron or steel molds, and invariably found their life to have been far shorter than hoped for. It is hard to beat the low cost of sand molds for repetition work of light sections in spite of the fact that these are destroyed in getting the castings.

No Such Thing as a "Permanent" Mold

The permanent mold is non-existent, so far as our present means are concerned, and it is far better to search for the "long-life" mold which may be used repeatedly before necessary repairs become too pronounced and it must be discarded. The molds of today giving reasonable satisfaction are of this type, and much money can be saved if, for instance, a large cope can be used 20 to 30 times—with but little patching, even if a new drag must be made for each casting. Since the subject is of great importance, it is well to consider more in detail the principles involved in making a long-life mold.

Two Effects of Hot Metal on Molds

PRIMARILY, one must reckon with the molten metal when coming into contact with the sand or metal mold surfaces as having a two-fold effect: First, the washing away of such surfaces in part; and second, the destruction of the surfaces as the result of the high temperatures involved, and consequent penetration of the metal. In the case of the sand mold, insufficient strength at

corners means a rapid crumbling, weak bond allows lifting out of sand and passing it along in the mold. Ramming too hard, sand too damp, and a number of other defects in the sand and its manipulation mean that the surface of the mold is damaged.

Even with a perfectly good mold, the speed of the running metal and impact upon obstructing surfaces, may cause cutting with the result that, even if stripping were otherwise possible, the mold could not be used again. Similarly with the metal mold, continued pouring through the same channel is certain eventually to cut it badly, the temperature question being involved also, for the foundryman needs only recall the "burning-on" process for repairing castings to understand the action under discussion.

High Temperatures Ruin Sand and Metal Molds

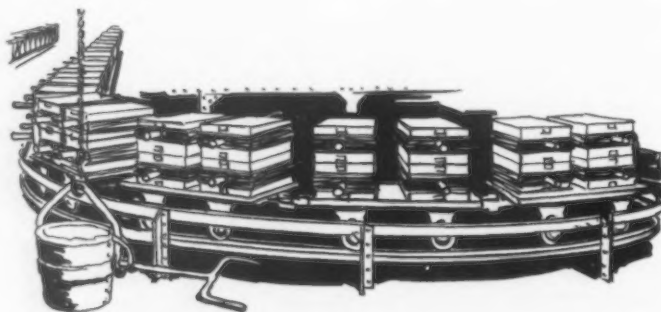
When it comes to the second consideration; namely, the high temperatures worked with, the sand mold suffers from vitrification of the clay bond and consequent ruining of the sand surface, with penetration of iron into it. For the metal mold this high temperature applied continually means firecracks, growth of the iron, lifting of patches of metal, and a general break-down of the contact surface little by little. The result in both cases is that the castings suffer in appearance and, with the metal mold they will be difficult to lift out at all.

An interesting example of this was seen in a European pipe plant where, in view of the high cost of steel molds, some of cast iron were used. It was not long before the effect of high temperature and the unavoidable mechanical abuse in removing the castings had torn so many patches of surface iron from the mold that the pipe surfaces were badly pitted and even after coating with tar left them as "seconds."

The metal mold, however, in spite of its cost, the comparatively early advent of firecracks, and the undeniable hardening of iron castings made in it—necessitating subsequent heat-treatment—will continue to be used for special lines of work. Thus, they will serve where machinability is not stressed very hard, and where the molds are water or oil-cooled and properly sectioned for rapid withdrawal of heat their life in considerably prolonged.

Again, in centrifugal casting, the heat balance between

the hot mold and the cooling molten metal may be held so delicate that the iron freezes almost as fast as applied in the form of a wide ribbon of spiral shape but firmly united with the setting metal preceding it. This may be seen in pipe made centrifugally in metal molds, the eye easily



following the spiral lines running from one end of the outer surface to the other.

Molds of Refractory Materials

THE other direction to follow is the preparation of molds of refractory materials, such as sand, firebrick, graphite, magnesia and other like heat-resisting agents, with the idea of using them repeatedly until the cost of patching up between casts becomes uneconomical. Thus, it is perfectly possible to make a mold of well-jointed firebrick which will last for many casts with but little repair.

Indeed, many up-to-date foundries have a flat, well-laid firebrick base serving for the drag, with bolts properly anchored to hold the cope of the ordinary molding sand type. This brick surface is dried by the torch before bolting on the cope and pouring off. On removal, the outline of the individual brick may be seen on the surface of the casting, if the brick drag has been long in use but, on machining the casting, the iron will be found perfect in appearance.

While green-sand molds will probably not lend themselves to any easy method of being made of the long-life variety, loam molds can be made which may be used several times safely. This is a matter of a sufficiency of clay to retain at least a little of the bond until the end of their life, and careful coating of the surface with graphite each time. Naturally, the draft must be quite pronounced and the mold so designed that the parts are easily disconnected.

Gas Carbon Most Refractory Material for Molds

Probably the best refractory material for long-life molds is gas carbon properly bonded by pitch, put into the desired shape under hydraulic pressure, and carefully calcined to carbonize the binder and prevent the subsequent formation of any gases when in contact with molten metal. Clay, magnesia, alumina, and other materials of a highly refractory nature can be bonded up with a binder which will hold the particles together even though vitrification under high heat will have destroyed the natural bond of the material. Thus, clay when vitrified, loses its bond completely. To use it for continued contact with molten metal, a pitch bond which will carbonize or a mineral bond, such as water-glass, will hold the clay particles together even after vitrification.

The difficulty, however, with all the refractory materials enumerated is that they are granular in structure and consequently cannot prevent extremely high superheated molten metal from penetrating inward sufficiently to mean a tearing away of portions of the surface of the molds when the metal has become cold. Hence, gradually the very slight damage to the mold surface becomes more pronounced and patching is necessary.

The only way to prevent this action is to coat the molds with a flaky substance, which is also refractory, which effectually "shingles" the surface and prevents penetration by the metal. This is quite possible by using

flake graphite, every particle coated with a binder—preferably clay or bentonite—so that the flake will adhere to the mold surface even under the conditions of high temperature. Indeed, it is found very advantageous to coat metal molds with graphite right along, though it is usually applied with an oil vehicle. But having no bond, it is thus partially wasted.

Summary and Conclusions

SUMMARIZING the situation for drawing conclusions, it would seem that the most promising developments in making long-life molds will come from a combination

of the metal mold with a refractory material coating. This is not new, for even the application of a substantial coating of graphite in oil will show a prompt reduction in the chill or hardness of the iron poured into such a coated metal mold; though a far better and highly reliable coating is had with fire-clay bonded with water-glass and vitrified after application, as is the case with one excellent mold system on the market.

A fairly light iron mold, thus

coated, will have a very good life if the coating is protected by a further cover which prevents the penetration of the molten metal into the surface for its ultimate destruction. Such a coating, in the system referred to, is had by smoking the surface each time with an acetylene flame, and this answers very well for light castings.

For heavy work, however, the life of the coated mold might be much prolonged if the cover put on for each cast were of a more substantial character. The long-life mold problem has now arrived at this point, and subsequent developments will be awaited with high interest by the entire foundry industry.

Sea Water Corrosion Leaves Strength Unimpaired

THE question having arisen whether corrosion weakens metal of the test bar otherwise than by removing material, experiments have been carried out by the British Institution of Civil Engineers on bars of medium carbon steel and of wrought iron, which had been totally immersed in sea water for five years. In these experiments tensile tests were applied to test pieces of the same pattern, one cut from an exposed bar from which all corroded surface had been completely removed, and the other from the unexposed bar.

The results showed no greater difference in yield point and maximum stress than would be expected between two bars of the same unexposed material, and although apparently in elongation and reduction of area the differences are appreciably greater than would be expected between two well made bars, the nature of the fractures was strikingly similar. It was therefore concluded that exposure to sea water produced no deterioration of the material except where corrosion could be seen.



Dr. Richard Moldenke

Dr. Moldenke States:

☐ Metal Molds with Refractory Coating Are Most Promising Development

* * *

☐ Most Refractory Material for long-life Molds Is Gas Carbon

* * *

☐ "Permanent" Mold Is a Misnomer; "Long-Life" Is Much Preferable

* * *

☐ High Temperatures Damage Both Sand and Metal Molds

Status of Alloy Steel Castings

SINCE 1922 there has been a steady increase in the production of alloy cast steels. An analysis of the statistics of the American Iron and Steel Institute shows that in 1922 approximately 5 per cent of the total American output of steel castings was alloy steel castings, whereas in 1928, the last year for which these data are available, approximately 14 per cent of the total castings was poured in alloy steel. This means that in 1928 nearly two and one-half times as many alloy steel castings were produced as in 1922, although the total steel casting production was about equal in both years.

Much of the increase in the use of alloy steels has occurred in the last three years of this period, and it is the opinion of the writer that the year 1930 will show an even greater increase than any previous year. This is due to the fact that many consumers of alloy steels have had satisfactory results from early trial lots of alloy castings and have substituted such castings for the regular carbon steel castings in their product in increasingly greater quantities, thus increasing the demand for the former.

Largest Demand Is for the Smaller Castings

THE greatest demand for alloy steel castings has come from the user of small or medium sized castings which are to withstand exceptional service rather than from the user of the large heavy castings. In the case of the latter, strength is usually the property desired while in the smaller castings a great variety of properties such as resistance to wear, resistance to fatigue, exceptional toughness, great hardness, or high strength at elevated temperatures may be required. As a result a variety of steels is required to meet these properties.

Although the merits of alloy steels in general have been fairly well established, sound engineering sense demands that before a large number of alloy castings is ordered for any given service, the suitability of the analysis specified must be established and, therefore, the consumer is not apt to order large amounts of alloy cast steels until their advantages have been demonstrated. As a result, in many instances, the initial requests for alloy steels come in the form of small orders. This has caused a concentration of the alloy cast steel production in those foundries having electric furnaces. These furnaces have the advantage of not only providing greater flexibility because of the smaller-sized heats made, but of being the most satisfactory type of furnace capable of producing metal of the fluidity required to pour light sectioned castings of intricate design. However, there has also been an increase in the alloy tonnage of the open-hearth foundries, especially in those alloys of simple analysis of proved worth.

Increase in the demand for alloy steels in general, in the opinion of the writer, is caused by the progress being

Simple and Complex Types Increasing—Heat Treatment Now General—Varieties Follow Three Main Channels

By DAVID ZUEGE*



having definite special properties or better combinations of properties than ever before.

Secondly, the producer of steel castings has realized to a greater degree than ever before the possibilities from the addition of various alloys to cast steel. The excellent properties which have been obtained from a number of alloy combinations experimentally produced, and cast first in simple designs, have stimulated the foundrymen to a vigorous study of the conditions existing when such metals are cast in molds of intricate designs. Thoughtful consideration of these conditions is absolutely essential to the production of satisfactory castings of special composition, because the majority of such steels is more brittle than the regular carbon steels, not only during solidification, but at any time before they have been given their proper heat treatment.

Development of a procedure which will minimize the strains set up during the cooling of the casting or during the subsequent cleaning operations requires a knowledge of both mold and metal conditions. The accumulation of such knowledge and its subsequent application to production methods have resulted in effective shop practices, so that today it is possible to produce sound alloy steel castings in a much greater variety of shapes and sizes than was the case a few years ago.

Thirdly, there has been marked, progressive improvement in heat treatment, as applied to steel castings. This progress was essential to develop all potential physical properties. Several years ago liquid quenching of castings was considered more or less of an experiment, except as applied to austenitic manganese steel. Today numerous producers of alloy steel castings include such an operation in some of their heat-treating procedures.

Two Main Groups of Alloy Steel Castings

ALLOY cast steels of today may be divided into two groups. The first of these, which we shall call the simple alloy group, contains all of the special steels having relatively small percentages of the elements chromium, nickel, vanadium or molybdenum, not found in the regular carbon steel castings; also those special steels having the elements manganese and silicon present in larger amounts than usually found in the regular carbon steels. Austenitic manganese and silicon steels are, however, not included in this class.

The second, or complex alloy group, includes those steels having very definite, unusual properties, for extraordinary

made along three distinct channels. In the first place the demands of the consumer upon the manufacturer of castings have increased because industry demands that mechanical equipment run under more severe service conditions than ever before. Higher speed, greater loads, higher operating temperatures, more corrosive media, all are examples of conditions requiring steels

*Metallurgist, Siver Steel Casting Co., Milwaukee.

purposes, and containing usually a relatively high percentage of one or more of the special alloying elements. Such steels are usually austenitic, or martensitic, in structure when cooled slowly to room temperature.

Intermediate Manganese Steels Less Expensive

Probably the simplest steel of group one, and that which has been made in the largest quantities, is a steel having a manganese content of about 1.10 to 1.60 per cent with a carbon content ranging between 0.22 and 0.37 per cent. Physical test values are published as being regularly obtained from cast steel with a carbon range of 0.27 to 0.37 per cent and a manganese range of 0.35 to 1.55 per cent, as follows:

	Normalized at 1650 Deg. F.	Normalized at 1650 Deg. F. Drawn at 1275 Deg. F.
Yield point, lb. per sq. in.	60,000	52,000
Tensile strength, lb. per sq. in.	95,000	85,000
Elongation in 2 in., per cent.	20.0	24.0
Reduction of area, per cent.	40.0	45.0

Some producers feel that a carbon content of 0.22 to 0.32 per cent and a manganese content of 1.15 to 1.35 per cent produce a more serviceable casting, due to increased toughness. Some strength is purposely sacrificed to obtain greater ductility. The fact that both of these grades of manganese carbon steel are being made in large amounts under various trade names is ample evidence that they are giving excellent service. This is especially true in those cases where the castings receive no further heat treatment than is given in the foundry. After such treatment the properties of the manganese-carbon steels very closely approach those of some of the more expensive alloy steels and their cost is considerably less.

The addition of approximately 1 per cent of silicon to steels of the manganese-carbon grade is believed by some to impart not only better physical properties, but also beneficial casting properties, if the carbon is maintained fairly low (0.20 to 0.30 per cent).

Higher Properties from the Chrome and Chrome-Nickel Alloys

Second in demand in the simple alloy group are the chrome and chrome-nickel series. The chrome steels having a carbon content of 0.35 to 0.55 per cent and a chromium content of 0.75 to 1.50 per cent are used where resistance to abrasion is required without a great degree of toughness, while the chrome-nickel steels, after proper heat treatment, combine high strength, resistance to abrasion and toughness. Several steels are being made varying

from an analysis similar to S.A.E. 3135 to one corresponding to S.A.E. 3240. In most cases, however, the manganese content is slightly higher than given in S.A.E. specifications. Most of the straight chrome-nickel cast steels would be located somewhere within the following range:

	Per Cent
Carbon	0.30-0.50
Manganese	0.60-0.80
Chromium	0.60-1.25
Nickel	1.25-2.50

In the normalized and drawn condition the chrome-nickel steels have slightly better physical properties than do the manganese-carbon steels. A representative specification for the chrome-nickel steels requires the following minimum values after normalizing and drawing:

Yield point, lb. per sq. in.	65,000
Tensile strength, lb. per sq. in.	100,000
Elongation in 2 in. per cent.	18.0
Reduction of area, per cent.	30.0

Chrome-nickel steels show a marked superiority over steel containing 1.35 to 1.60 per cent manganese, at the higher hardness values. The former are much more susceptible to liquid quenching. Therefore, a higher draw temperature may be used with these steels to obtain a definite hardness value than in the case of the manganese carbon steels. The higher draw temperature usually results in increased ductility.

Therefore, if the castings are to be used with no additional heat treatment other than that given in the foundry, it is often most economical to use steels of the manganese-carbon type, but, if higher hardness values are required, the more expensive chrome-nickel steels are more satisfactory.

Complex Alloy Steels Are Wide in Variety

A wide variety of alloy steels other than those mentioned is being made, most of them containing 0.75 to 2 per cent chromium, with small percentages of other elements. Among the combinations which have come to the writer's attention recently are chrome-nickel-manganese, chrome-manganese, chrome-vanadium, manganese-molybdenum, chrome-molybdenum, chrome-nickel-manganese-molybdenum. Although some of these more complex steels have been made in relatively small quantities thus far, the physical properties and results in service have been exceptionally satisfactory, and, no doubt, a marked increase in the production of these steels will occur.

The use of molybdenum seems to be increasing rapidly. This element is replacing both nickel and vanadium in



David Zuege

Increased Demand Follows Three Channels

Alloy Steel Castings Fall into Two Groups

Larger Use of Molybdenum to Resist Abrasion

Many Types of Complex Alloy Steel Castings

Larger Demand for Intermediate Manganese Castings

In 1922, Alloy Castings Were 5 Per Cent of All Steel Castings; in 1928, 14 Per Cent



many compositions. Due to the air-hardening properties conferred by molybdenum, steels containing this alloy have given very satisfactory results in castings which, because of their large size or intricate shape, could not be liquid quenched but which, nevertheless, require considerable hardness to resist abrasion.

Many Combinations Possible

Since a variation in heat treatment causes marked changes in the physical properties of each of the above-mentioned steels, it is possible to secure a number of combinations of chemical compositions and heat treatments which will give satisfactory service under definite conditions. In some such instances it is difficult to determine whether it is the better policy to use a simple, relatively inexpensive steel drastically heat treated, or a more complex steel given a milder treatment. Experience is the outstanding factor through which may be secured a proper economical balance to govern purchases. Many factors other than the initial cost of the part effect the ultimate economies involved, and a close cooperation between consumer and manufacturer in exchanging information is necessary if the best results are to be obtained.

Although the tonnage of alloy steels of the second or complex alloy class is small as compared to the tonnage of the simpler alloy steels, the new developments in this field have at least kept pace with those of the simpler grades. The complex alloy steels possess definite, extraordinary properties, such as resistance to corrosion, resistance to oxidation at high temperatures, high strength at high temperatures, non-magnetic properties, etc.

Three Chief Types of High Alloy Content

ALTHOUGH, as in class one, steels having a variety of chemical compositions have been made, the three most prominent types of the complex alloy steels are the 10 to 15 per cent manganese steel having exceptional abrasion resistance under conditions which work-harden the surface; the stainless steels of about 13 per cent chromium; and the heat-resisting steels containing large amounts of chromium and nickel. An exceptionally large number of

varieties of the high chrome-nickel grade are being made under various trade names. No attempt will be made here to list the various analyses, except to mention the 18 chromium-8 per cent nickel steel which is giving excellent service in high pressure power plant and oil refinery installations.

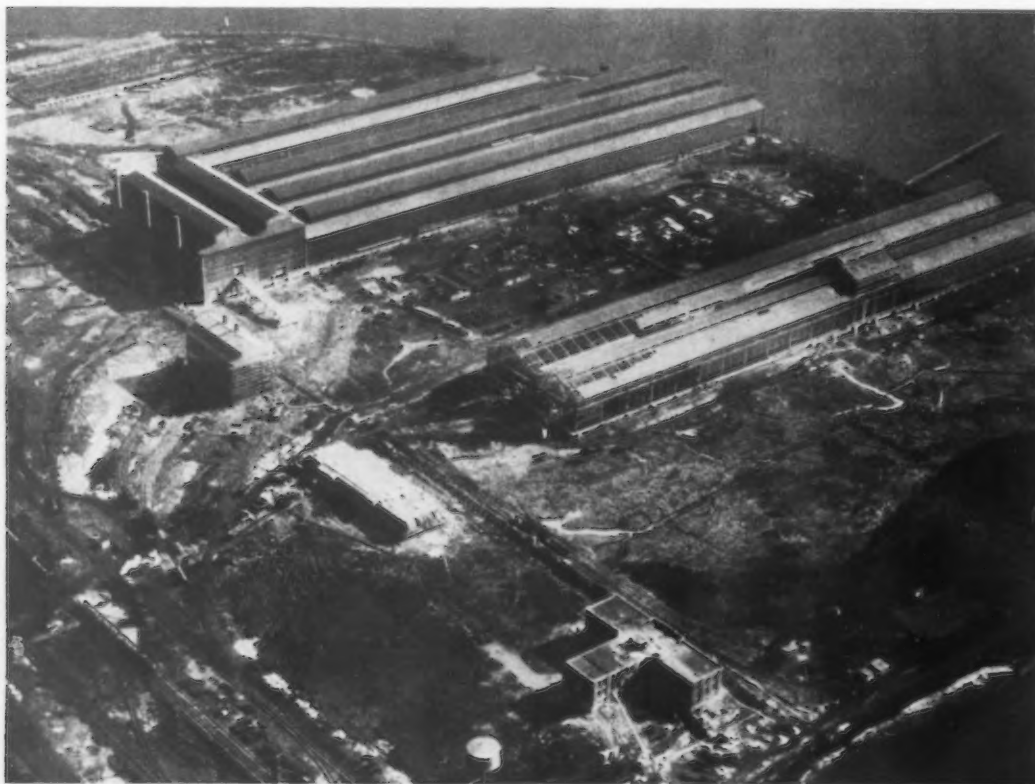
Producers of cast steels of these analyses have benefited materially through the knowledge which they obtained from the manufacturer of these materials in the rolled state, concerning their properties. However, skillful, well-regulated foundry practice is required if satisfactory results are to be obtained from these cast materials. This applies to an even greater extent than in the simpler alloy steels, for the care used in making the steel and the measures adopted to prevent internal cooling strains are reflected to a greater degree in the results which are obtained from an unusual composition than from an ordinary one.

Greater Knowledge Resulting in Wider Use

IT is clear that a considerable development has occurred in the past year in the field of alloy steel castings, not only in the accumulation of knowledge concerning the properties of the various steels, but in the practical application of such knowledge to the foundry. As a result, more serviceable castings have been produced, causing a greater demand for the product, in many of the alloy grades.

The properties of the alloy steels now being made have not yet been developed to the highest degree. As these properties are more fully developed, the demand for alloy steel castings will increase at a greater rate than heretofore. Also it is believed that more work is being done in studying the properties of new analyses, some of which at least are bound to become of commercial significance.

This greater activity on the part of the producer, together with the better cooperation obtained from the consumers, should result in castings which will more effectively withstand the increasingly more difficult service conditions, which in turn will cause a greater demand and greater production of alloy cast steels.



Foundry Nears Completion

A \$14,000,000 Steel Foundry at Eddystone, Pa., as Seen From the Air, Will Be Operating This Summer, Producing Large Integral and Other Castings for Locomotives. The integral castings weigh up to 150,000 lb. As foundations for the plant, built on a swamp, over 23,000 piles were driven—an engineering feat. It is the main foundry of the General Steel Castings Corporation of which A. S. Blagden is vice-president and general manager; E. Walcher, manager of operations, and W. R. Chambers, chief engineer.

Current Progress in Malleable Iron

Bolts Now Made of Malleable Iron—Growth in Use of
High-Strength Castings—Fuel Cut
Down 46 Per Cent

IN common with numerous other lines of industry, the malleable iron business during past years has shown marked advancement in several important directions as indicated in what follows.

Guided by the work initially undertaken by several malleable casting plants, there are today a substantial number who have followed the example of these pioneers and are running on a

very high-quality product in order to be in a position to satisfy a demand that, while slow in making itself felt, is now expanding in a very gratifying manner.

Progress in an industry is confronted and hindered at time by forces occasioned by justifiable resistance on the part of the consumer who first must be convinced regarding the trustworthiness of such claims as are made. As no manufacturing company, whose requirements for castings are large, is willing to limit its ability to satisfy its needs to too few sources of supply, it is essential, therefore, when a radical step is undertaken by an industry, to see that through cooperative effort customer demand can be safely met. Until this state of affairs is assured sales naturally will be retarded.

Fortunately it has happened that advancement in this direction has kept pace with the rate with which it has proved feasible to demonstrate to the customer that it is now possible for him to obtain from a sufficient number of plants a very high-quality product.

High-Strength Malleable Now Available

REGARDING the progress that has been brought about in the making of malleable iron of a strength and toughness that easily enables it to successfully compete with the ordinary steel casting or pressed or welded part, the following is pertinent:

Since the advent of this high-strength product, the cases where castings have been changed from steel to malleable iron are much more frequent, particularly if the parts are to be machined.

Prof. Touceda Says:

☞ Bolts of Malleable Iron Resist Corrosion
* * *

☞ Steady Progress Toward Higher Quality
* * *

☞ Carborundum Recuperator Reduces Fuel Consumption in Air Furnace
* * *

☞ Electric Annealing Produces a More Easily Machined Metal in Short Time



Enrique Touceda
Consulting Metallurgist,
Albany, N. Y.



In the case of three bridges recently constructed in Pittsburgh, the bridge engineers selected malleable iron in preference to steel for the guard rails.

That they were justified in so doing is borne out by the fact that, since their installation no car or truck has crashed through these rails, in spite of the many accidents that have occurred. In but one case, where one post actually was torn from its

foundation, but which subsequently was again used since it was found to be uninjured, no damage has been sustained from the impact that did not admit of easy repair without the necessity for new parts.

Malleable iron was chosen by the bridge engineers instead of steel in the case of a large and very heavy expansion joint, designed with intermeshing teeth to allow for such an amount of expansion in the bridge as takes place from time to time. In the latter case these teeth had to be machined, while with the former this was found to be unnecessary due to the very smooth casting surface and trueness to dimensions.

Comparative tests of malleable iron as against steel bolts of the same size have demonstrated that the tensile properties of the former are substantially higher, and in service it has been found that they resist corrosion better when exposed to underground conditions.

An attractive field for this high-tensile product has been opened up along electrical lines, because malleable iron is a metal having high induction and permeability, accompanied both by a low hysteresis loss and coercive force. The high-tensile product is in this respect superior to the low-quality product in that it contains a smaller amount of temper carbon and the electrical properties are enhanced accordingly.

Air Furnace Recuperator Saves Fuel

CONCERNING such improvements as have been made in the direction of metallurgical apparatus, the most outstanding achievement is the air furnace recuperator

designed and built by the Carborundum Co. of Perth Amboy, N. J. The appearance of this apparatus on the market is so recent that we have results from only one installation.

In the first two weeks after operations, during which 23 heats were run off on this furnace, the average coal consumption was reduced from 918 lb. to 591 lb. per ton of iron melted. The decrease in melting time also has proved very gratifying, in that a melt of 13 tons in the afternoon required but 2 hr. and 55 min. from the time the blast was put on until the heat was tapped, an hour better than previously obtained. The management is of the opinion that possibly still better results may follow from the use of a more suitable coal, from the running of the furnace at full instead of 60 per cent capacity, and from improvement in technique.

Electric Annealing Cuts Down Time

USE of the electric oven for annealing has made possible a fine adjustment of total time and temperature for heat treatment to variations in hard iron composition which has permitted of a cutting down of the annealing time to minimum limits. Three of these ovens lately have been installed at one plant and a battery of 12 is seriously being considered by the same company. The

ones in operation are running on a three-day cycle, except occasionally on certain compositions that require a maximum of four days.

Many tests of the product annealed in these ovens have demonstrated that, owing to the delicacy with which the temperature and oven atmosphere can be controlled, the castings invariably can be machined with the greatest ease.

That the industry is impressed with the practicability of the short anneal is certain and while all innovations are slow in taking hold, there seems to be no doubt but that within a reasonable time many of the plants will be equipped with at least several of these ovens to take care of orders calling for quick delivery.

Rotary Melting Units in Europe

ROTARY melting furnaces are now being built on the other side from which flattering results are being obtained in numerous directions. Melting time has been greatly reduced, fuel economy enhanced, and particularly has the life of lining been increased. No installations have as yet been made on this side, but I understand that one manufacturer of foundry equipment in this country has secured the rights to build one make of this type melting furnace.

Sponge Iron from Brazilian Ore with Coffee Husks as Fuel

IN THE IRON AGE of April 25, 1929, a description was published of the sponge iron process as developed by William H. Smith, president, General Reduction Corporation, Detroit.

Experiments have been conducted by Mr. Smith in his semi-commercial plant at the University of Detroit to reduce Brazilian ores to metallic iron by his process. Some of the iron ore, forwarded to him from Brazil, was run through his equipment, using coffee husks as the fuel reducing agent. A sponge iron was obtained containing 99.9 per cent iron. Mr. Smith reported to his friends in Brazil that "it is quite possible that this is the highest grade iron ever produced from 100 per cent Brazilian material."

In recognition of this fact a medal was compressed from some of the Brazilian sponge iron, or iron powder, and sintered solid without melting, with the signet of the General Reduction Corporation and the University of Detroit embodied thereon, bearing also the name of the Brazilian chiefly interested, Fortunato Bulcao, and Mr. Smith. In sending the signet to Mr. Bulcao, Mr. Smith

added: It "may well mark for Brazil a new era in the production of iron, as well as the art of pressing iron sponge into forgings without melting." The two sides of the signet are here reproduced.

Lighter Railroad Coaches

IN the *Révue de Fonderie Moderne* for Feb. 10, some details are given of the Wagon-Lits or sleeping cars which were designed to reduce weight by employing light alloys wherever possible. The roof is covered with the hardened aluminum duralumin, and the doors are built of silumin (cast aluminum-silicon alloy). The thickness of the metal siding has been reduced and a saving of 0.7 lb. per sq. ft. effected. Silumin is also employed for details on beds, furniture and miscellaneous fittings, with the result that the complete coach weighs 48½ tons, or 3½ tons less than originally anticipated. Since comparative steel coaches weigh 57 tons, the total saving is 8½ tons, or 15 per cent.



THIS Signet Is Made of
Sponge Iron from Brazilian
Iron Ore and Brazilian Fuel.
The two sides are shown with ap-
propriate designations



New Equipment for the Foundry

*Devices for Molding,
Conveying and Melting*



*Most of Them for
Showing at Cleveland*

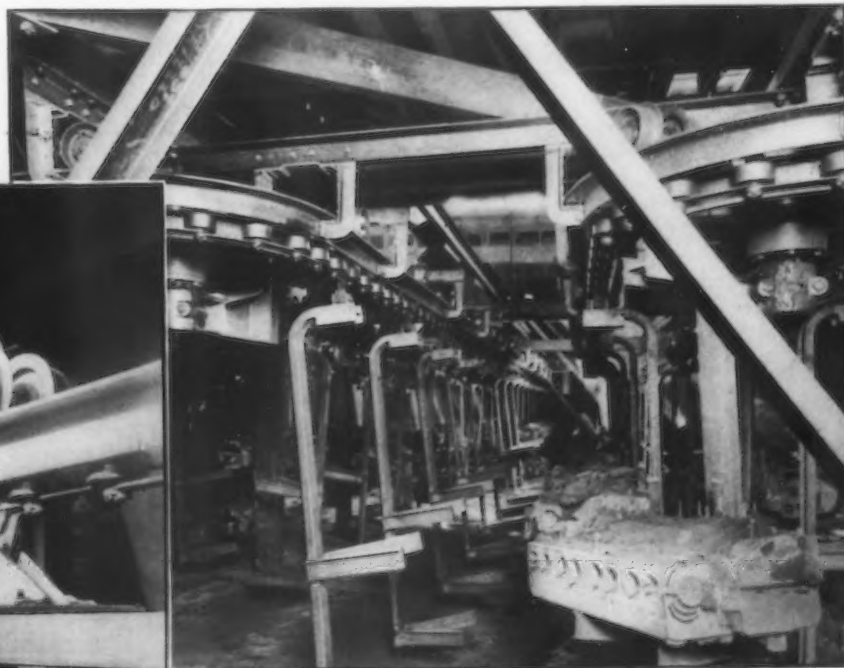
"FOUNDRY WEEK" will be celebrated at Cleveland when the thirty-fourth annual meeting and the twenty-third exhibition of the American Foundrymen's Association take place, May 12 to 16. On this and the following pages **THE IRON AGE** presents some of the features of the displays of the nearly 250 companies which will be represented in the Cleveland Auditorium. Other exhibits will be covered later. Accompanying them is a group of portraits of the officers of various local foundry organizations affiliated with the A. F. A.

Suspended Carriers for Foundry Use

TWO types of carrier—one for castings and the other for cores—are shown in photographs of equipment supplied by Palmer-Bee Co., Detroit. These are of recent installations in plants making automotive castings. One picture shows hangers suspended from overhead conveyor units at the American Foundry, Indianapolis. This pendant type conveyor handles block castings for six-cylinder and eight-cylinder engines, and is employed here for cooling the castings prior to clean-

ing. In the other picture is a form of rack for core ovens, used by the Nash Motors Co., Kenosha, Wis. This close-up view shows the racks suspended from the overhead line. The sectional trays permit heat to get at

all parts of the cores as they pass through the continuous baking oven. Core makers are located on either side of the conveyor, thus facilitating loading as well as casual inspection.





New Molding Machines Recently Developed

SEVERAL new machines have recently been put on the market by the Wm. H. Nicholls Co., Inc., Richmond Hill, Long Island, N. Y. Three of these are here illustrated.

One is a portable jolt squeezer, type 11 F. It has long cylinders and pistons ground to fit. One op-

the column to assure rigidity and long service. It is made both as a stationary and portable machine, the portable being the same as the stationary except that it is mounted on exceptionally heavy wheels, as shown.

These can be slipped off very easily, thus to convert the portable into a stationary machine.

Another jolt roll-over squeeze and pattern draw machine, type 21-RH, has been especially built to take in a wider range of operations in less time and with less help. It is precision made, with a minimum of

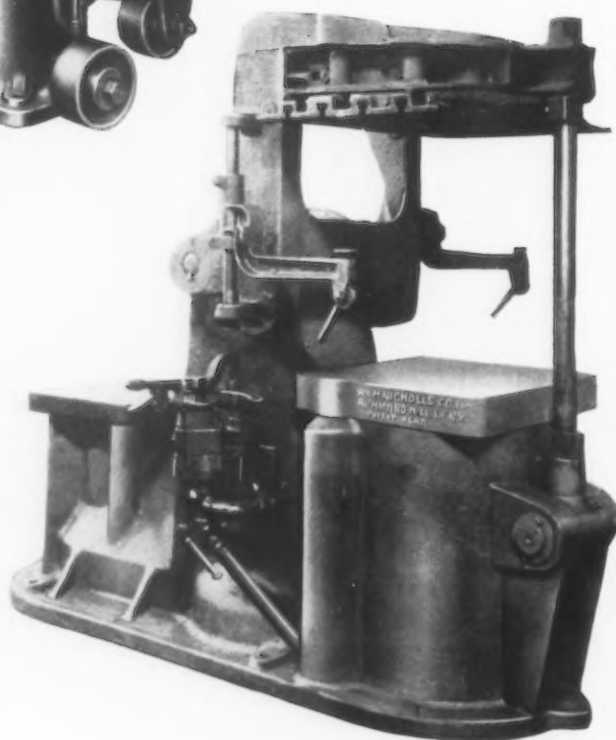
ment and rigidity. The bulk of the weight is in the base, which, of course, is subject to the greatest wear and tear from the strain and vibration of constant jolting. The upright is double extra-heavy tubing with large enough margin of safety to withstand at least 50 per cent more strain than it is subject to. The squeeze head is made of steel and guaranteed against breakage but light enough to be easily moved. Base and cylinder with valve bracket lugs for riddle holder and mold shelf are cast in one piece and not bolted together. All operations are performed with one operating valve, which is of the engineer disk type. The company recommends this machine particularly to jobbing or semi-jobbing foundries making snap-flask or double-faced match plate work.

New Sand-Blast Mask

A NEW sand-blast mask, known as the Watters Duo-Pressure Sand-blast Mask, is offered by the Standard Safety Equipment Co., Chicago.

Face piece, or mask, and pneumatic cushion, seal operator's face from dusty air, while a positive volume of clean air is supplied for breathing purpose. By the Duo-Pressure principle, all breathed air is exhausted from interior of mask simultaneously with delivery of fresh air. The face piece, or mask, contains large laminated lenses, which are kept clear of dust and steam or fog by air jets.

erating valve controls the jolting and squeezing. The squeeze piston is fitted with a patented composition packing ring, to secure tightness under pressure. The squeeze head, made of cast steel, swings horizontally and can be readily adjusted up and down to the proper height. The face of the squeeze head is at all times parallel to the top of the jolt table. The head has a large bearing on



working parts. The squeeze is made on the upstroke of the piston and draws the mold away from the pattern on the down or return stroke of the piston by gravity, thus to obtain a draw without power or hand energy. The machine has a 21-in. diameter squeeze piston, 28½ in. long, and has a 9-in. jolt piston. All operations are controlled with one valve handle.

The third machine illustrated is a jolt, squeeze and pattern drawing machine, type 11-H. It has long cylinders and pistons, assuring aline-



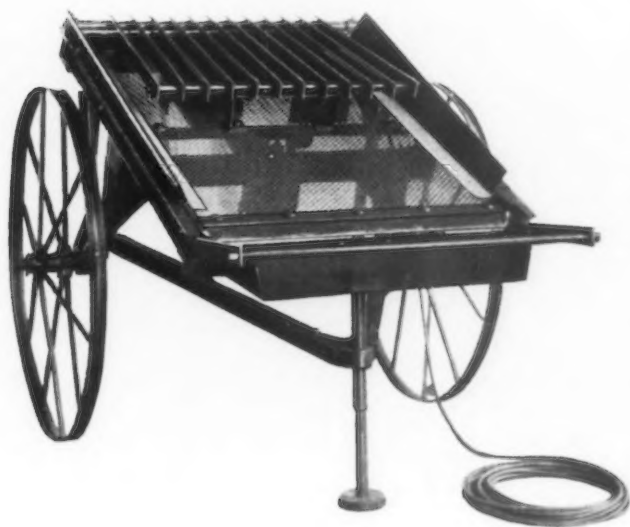


Lifting and Tilting Truck

DESIGNED particularly for foundries but available for many other uses is a lifting, tilting truck made by Clark Trutractor Co., Battle Creek, Mich. As shown in the illustration, it is handling loaded annealing pots into and out of the ovens. It is particularly adaptable also, from its power and mobility, to handling heavy castings from shake-out to cleaning, chipping and sand blast and from inspection to cars or trucks. Capacity is for a load of about 2640 lb. Lifting and tilting are controlled by a single lever; the maximum tilt is 50 deg. An automatic stop positions the lift. A counterweight is in the driver's platform. Wheelbase is 45½ in. and the truck has a turning radius of 119 in. The gas engine is of standard tractor type.



Foundry Screen with Vibrating Attachment



ONE of the most recent developments for the foundry is a foundry screen with vibrating grizzly attachment, put on the market by the Deister Concentrator Co., Fort Wayne, Ind. It is claimed to be absolutely new and is designated as type M Concenco foundry screen. As the screen works toward the shakeout, which is shoveled to the ample screening surface, it leaves behind it heaped and conditioned sand ready for the molder. The refuse travels down the inclined screen surface and is collected in the removable waste box.

In the same operation this screen is claimed to cut, temper, fluff, aerate and heap the sand. It is contended that this screen handles twice as much sand as a gyratory riddle, and that it handles as much sand as two laborers can shovel, yet it is so easily wheeled about it can be used for one-man operations.

Large High-Frequency Electric Furnace

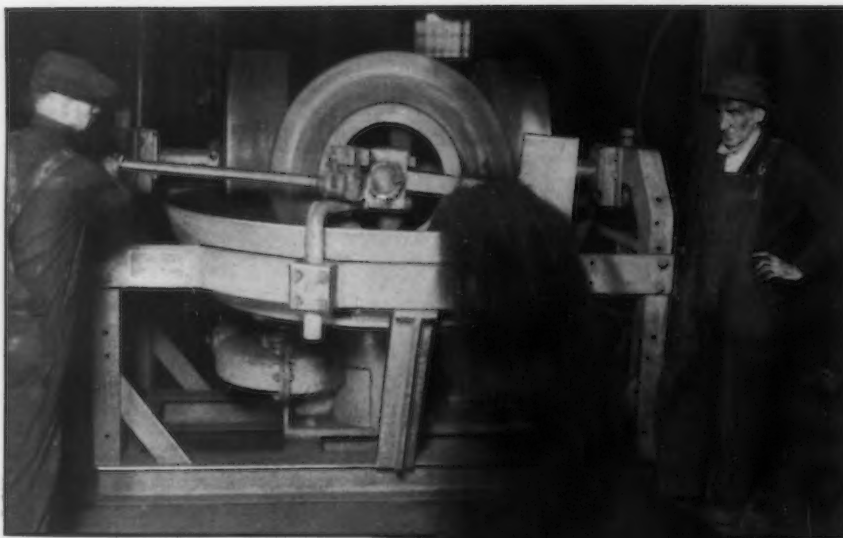


A 4250-lb., high-frequency electric melting furnace is now being built for the United States Government by the Ajax Electrothermic Corporation, Trenton, N. J. This company has also recently put into operation a 1-ton furnace operated from a 300-kw. motor generator. These are the latest developments along the line of increased furnace capacities of this new melting agent. The illustration shows a 1000-lb. furnace which will be on exhibit at the company's booth.



Foundry Sand Mixer

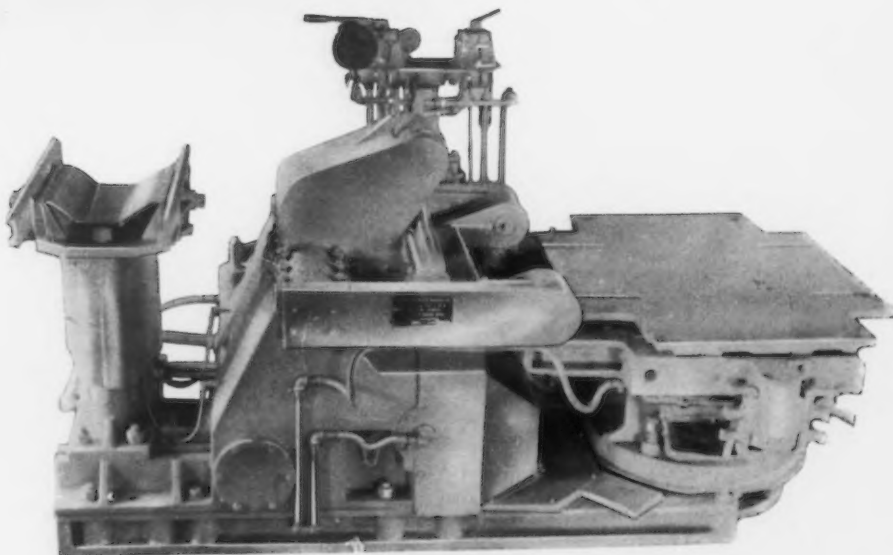
A NEW product of the Clearfield Machine Co., Clearfield, Pa., is a mixer for foundry sand. An attractive feature of this machine is the disk emptying device, as shown in the illustration. At the front, or emptying side, of the pan, in place of a rigid scraper, there is mounted a disk, shaped to the curve of the rim and free to revolve with the stream of material coming against it. The disk is located to throw the material between the muller and thus it acts as an efficient scraper, maintaining this position and function until the hand-lever is thrown forward by the operator. This method empties the pan very quickly, or in about 20 sec.



Rollover and Stripper Molding Machines



MOLDING machines, especially designed for stove plate and other similar work, have been brought out by the Herman Pneumatic Machine Co., Zelienople, Pa. Two of these, which are to be shown at the foundry exposition, are herewith illustrated. The rollover machine is similar to one of those here shown, which is one of the company's larger type plate machines. The other photograph represents the type of stripper referred to. In the demonstration of these machines at the exposition, the particular type of mold will be a door for a sectional boiler. The drag consists of a plate with the drag mold placed on it, and the cope consists of a flask which extends down over the drag.





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New England Foundrymen's Association



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President



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Secretary



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Associated Brass Founders of New England



G. W. Thornburg
President

Ohio Foundries Association, Inc.



Don McDaniel
President



Robert Hoierman
Secretary

Wisconsin Gray Iron Foundry Group

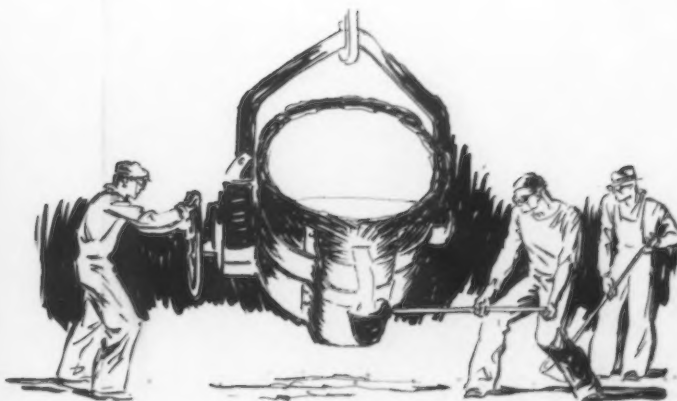


W. F. Bornfleth
Secretary

Twin-City Foundrymen's Association



C. E. Langdon
Secretary





Electric Zinc Melting Furnace

FOR many years the Ajax-Wyatt furnace has found increasing use for melting red brass valve mixtures, architectural bronzes, etc. The newest development brought out by the Ajax Metal Co., Philadelphia, builder of these furnaces, is the new electric zinc-melting furnace, herewith illustrated. This is intended for melting pure zinc, or zinc-base alloys, used in the die-casting industry. The illustration shows this furnace as installed at the works of the General Bronze Corporation, Long Island City, N. Y.

Portable Jolt Squeezer

A NEW type of jolt squeezer, having a side shelf, is being produced by the Arcade Mfg. Co., Freeport, Ill. The side shelf has an angle-iron frame with a heavy $\frac{1}{2}$ -in. wire screen to prevent the accumulation of sand on the shelf. It automatically keeps itself clean. Particular features of this machine are its weight, making for sturdiness and long life, and the pipe which supports the head, which has the rather large diameter of $5 \frac{9}{16}$ in. outside the heavy section. It is very easily moved along the floor, having one 12-in. and two 20-in. wheels.



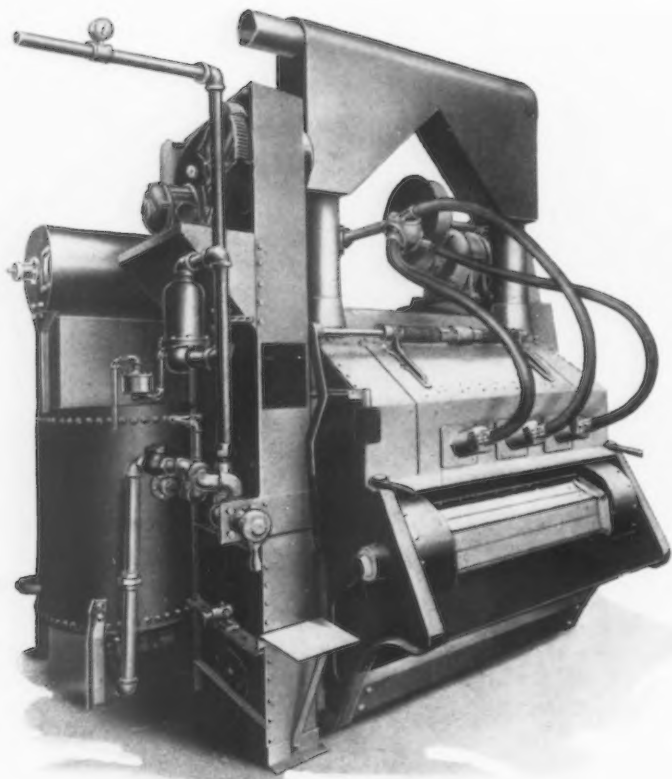
Grinder with Low Air Consumption

AN outstanding feature of a new grinder, shown for the first time at the foundrymen's exhibit, by the Buckeye Portable Tool Co., Dayton, Ohio, is its low-air consumption. The company explains that this is brought about by the manner by which the governor functions, the reduction of the speed under load being nominal or approximately only 10 per cent.

The tool, as illustrated, is known

as No. 320-3 Hercules grinder. It is built on the same principle as the company's No. 300 Series grinder with governor control, although it is lighter in weight because it is for use with 4-in. diameter wheels. The tool can also be furnished in the high-speed type. In fact, the only difference between the slow-speed and high-speed type machines is in the governor, which can be changed over quickly.



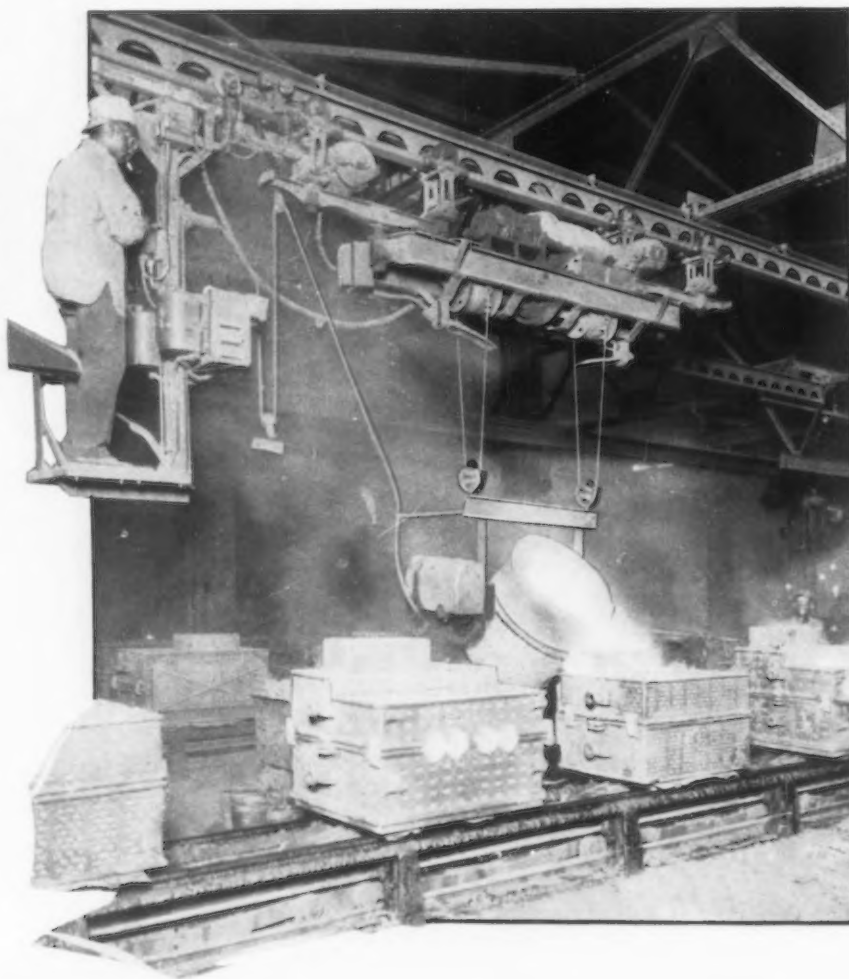


Improves the Tum-Blast

IMPROVEMENTS in the tum-blast cleaner, as developed by the American Foundry Equipment Co., Mishawaka, Ind., are claimed to make for greater efficiency in blasting and longer life. Improvements in the machine, as illustrated, include a rotary screen where all refuse is removed before the abrasive falls into a storage tank; an individual motor-drive for bucket elevator and screen; bifurcated pipe connection which insures proper ventilation without the loss of good abrasive; end-thrust bearings installed at the barrel heads; removable bronze sleeve bushings for easy replacement; one-piece flange bushings in the chain links; heavier side frames for greater reinforcement; water separator and trap to control moisture content; guarded drive and a pressure-indicating gage.

Overhead Pouring Equipment Facilitates Handling Hot Metal

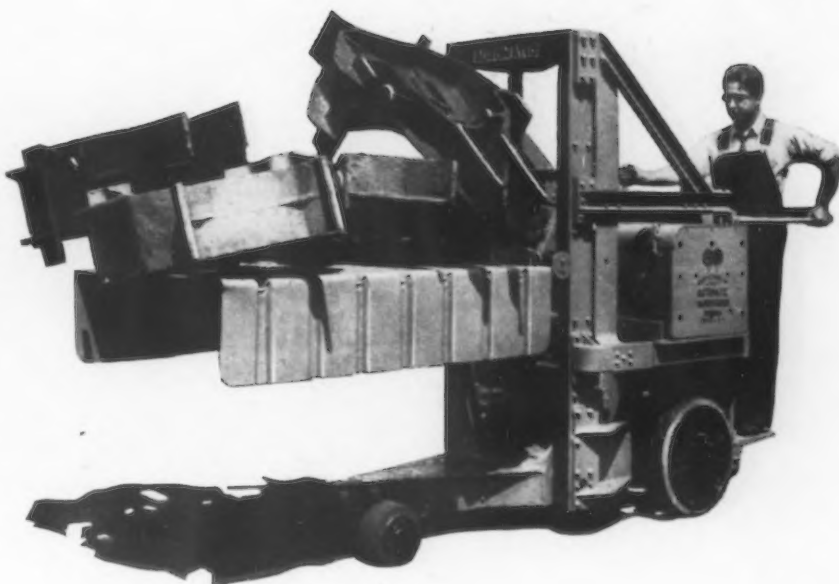
AN installation for pouring iron, made by Cleveland Electric Tramrail, Wickliffe, Ohio, is shown in the illustration. This equipment is in the Lakey Foundry Co. plant. As shown, the entire device is carried by the overhead tramrail, the ladle of metal being suspended from a unit separate from that which carries the operator. Control is entirely electric, both as to positioning of the equipment along the rail, elevation of the ladle and tilting of the ladle. The operator is in such position that he can adequately control the entire operation, as his vision of ladle and gate into which the metal is poured is uninterrupted.



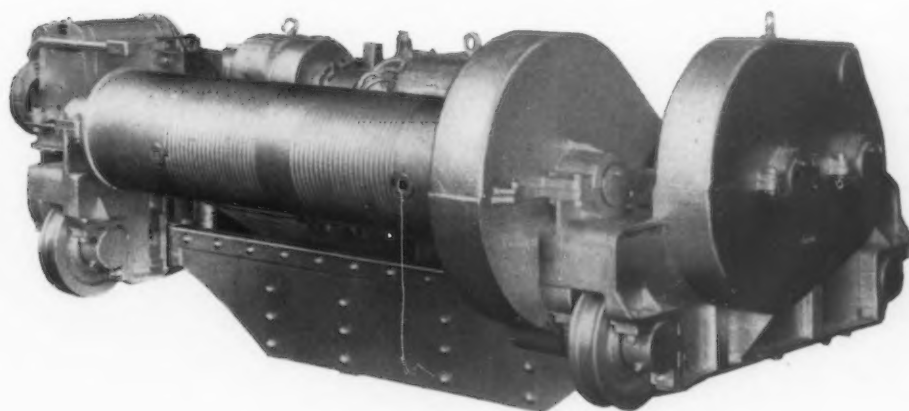


Tiering-Lifting Truck

A SPUR-GEAR-DRIVE tiering, lifting truck built by the Automatic Transportation Co., Buffalo, has capacity of 6000 lb. and is made in three standard lifting heights—40 in., 60 in. and 75 in. This is of the two-wheel, front-axle type and is said to have one-quarter greater operating efficiency in interplant transportation than the older model. Special die-handling winch attachment is available for handling dies and other heavy, bulky objects. Also, a self-loading and discharging roller platform may be had, operated by electric motor. This unit is designed particularly for handling castings, parts assemblies, axles, engines, etc., at whatever height may be required. All wheels have Timken roller bearings.

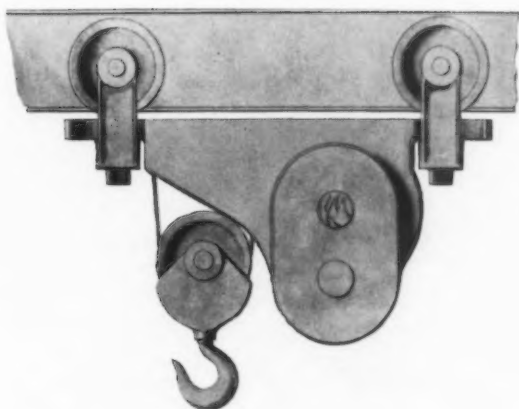


Crane Trolley Features Aluminum Parts



ALL of the main castings in the trolley illustrated, which is a truck of the Northern Engineering Works, Detroit, are of aluminum alloy. In addition, the structural material is in part made of aluminum alloy. This trolley is one of several built for the new rolling mill of the United States Aluminum Co. at Alcoa, Tenn. It is furnished throughout with Hyatt roller bearings and with hardened steel gears. Independent girts are used in connecting the two sides of the trolley, to carry the load. The hoisting mechanism is to be shown in operation in the foundry show.

Bantam Hoists of 500 Lb. Capacity

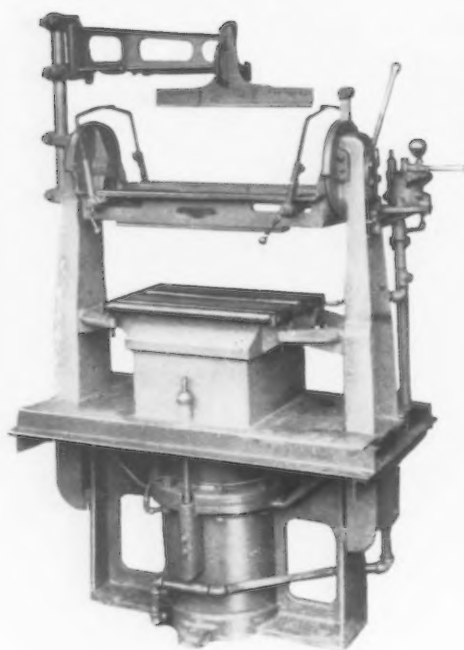


THE most interesting addition to equipment made by Robbins & Myers Sales, Inc., Springfield, Ohio, is its new bantam hoist. Special emphasis is paid to its small size, light weight and high power. It weighs 130 lb. complete with trolley, or 110 lb. without; in size, its over-all dimensions are 18 x 24 x 14 in.; speed of operation, 30 ft. per min.; capacity, 500 lb. Its piston lubrication system requires a minimum amount of attention. Aluminum finish has been applied to the entire hoist, assuring attractive appearance with safeguard against damage from exposure. It is manufactured for alternating and direct current, with either rope or push-button control.

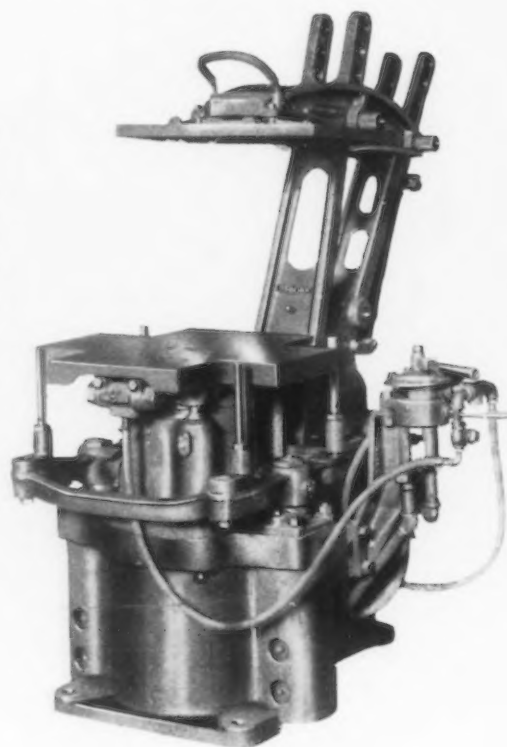




Jolt Squeeze Stripper and Rollover Molding Machines



TWO of the features of the display of the Osborn Mfg. Co., Cleveland, at the foundry exhibit, will be a jolt squeeze stripper molding machine, No. 720, for making cope molds, and a jolt rollover squeeze pattern draw molding machine, No. 331, for drag molds. Illustrations of these two machines are shown.



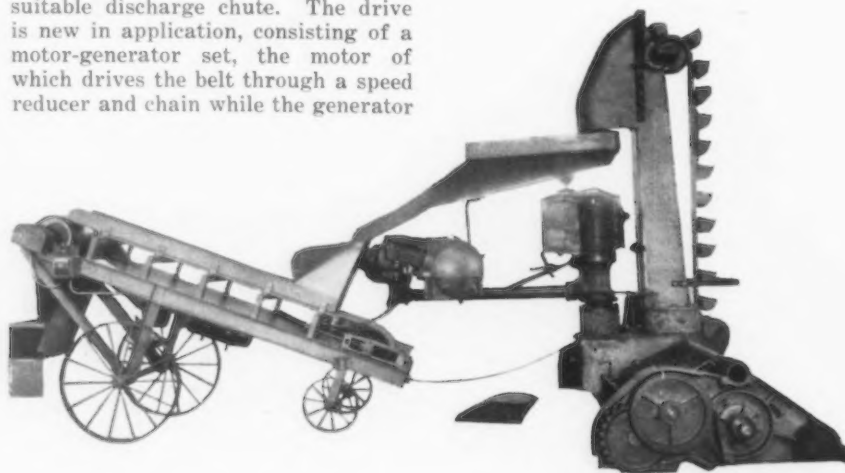
New Portable Electric Magnetic Separator

THE Beardsley & Piper Co., Chicago, announces a new portable magnetic separator unit, one of the few portable machines of this kind on the market. Until now magnetic separators made by this company have only been manufactured in types for use with belt-conveyor systems. The new unit goes further in providing positive separations of scrap, shot, and tramp iron from sand and other materials in any place about the plant. It may be placed under discharge

chutes or bins at the discharge or in front of the receiving end of the belt or flight conveyors, or it may be adapted to any machine or process where complete magnetic separation is necessary.

As illustrated, the new unit consists of a short belt running between two pulleys, the magnetic pulley being at the head or drive end. Metal parts or shot are picked up by the magnetic pulley and are carried over into a suitable discharge chute. The drive is new in application, consisting of a motor-generator set, the motor of which drives the belt through a speed reducer and chain while the generator

furnishes direct current at the correct voltage for the magnetic separator. This affords a unit that requires only one connection to the power supply which may be either direct or alternating current, as desired. The entire unit is mounted on a sturdy steel frame supported by two large wheels at the head end and two small wheels at the foot end.



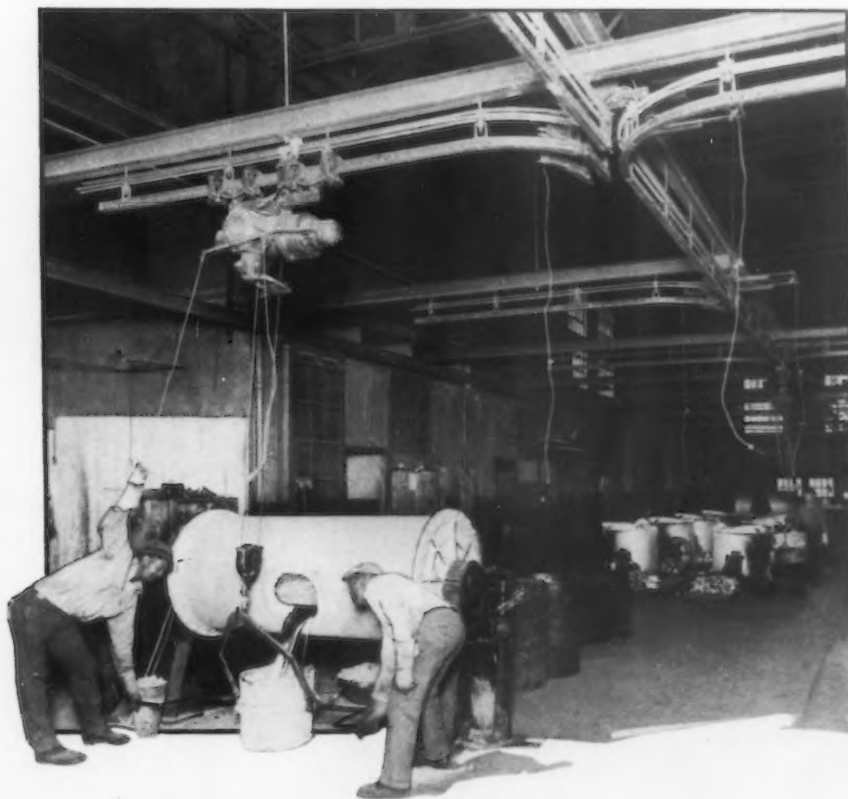


Overhead Rail Systems Facilitate Pouring

TWO illustrations show installations of overhead monorail made by the American Monorail Co., Cleveland. They are given particularly to show the flexibility which may be ob-

tained from such equipment. One picture is of a foundry installation in the Edison Electric Appliance Co. plant, Chicago, in which a somewhat complicated layout was put in to

permit uninterrupted pouring of iron. The loop and various switches directly in front of the cupola provide all the flexibility needed in this respect. A soft grade of gray iron is carried into the molding floors adjoining and castings are poured which eventually go into electric flatirons, stoves and other household and hotel equipment. In the lower illustration the same general type of overhead rail is used, differing in its suspension characteristics. In this case an electric hoist is employed in filling an aluminum ladle with the molten metal from the melting furnace. These ladles of metal are then kept hot in warming pots adjacent to the die-casting units where the material is used.





Machine Which Prepares Sand

A NEW portable sand-screening, blending, aerating and throwing machine has been designed by the American Foundry Equipment Co., Mishawaka, Ind. As illustrated, it is designed to prepare heap, facing and core sand, and for odd conditioning jobs when larger cutting and preparing machines are unavailable. It is known as the American Junior sand-preparing machine.

The sand is shoveled or fed through a steel grate into a vibrating hopper which feeds the sand into a rotor housing. In this housing the knives or shoes of a revolving rotor cut, mix and blend the sand and expel it under high velocity from the side of the ma-

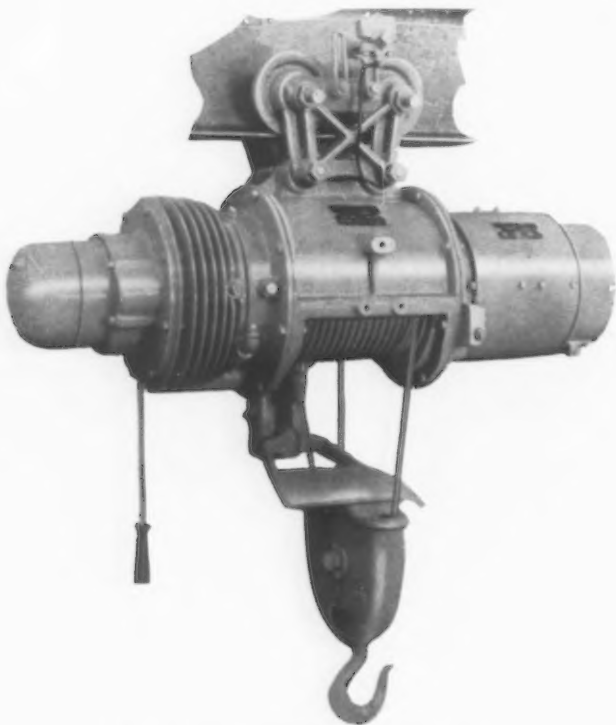
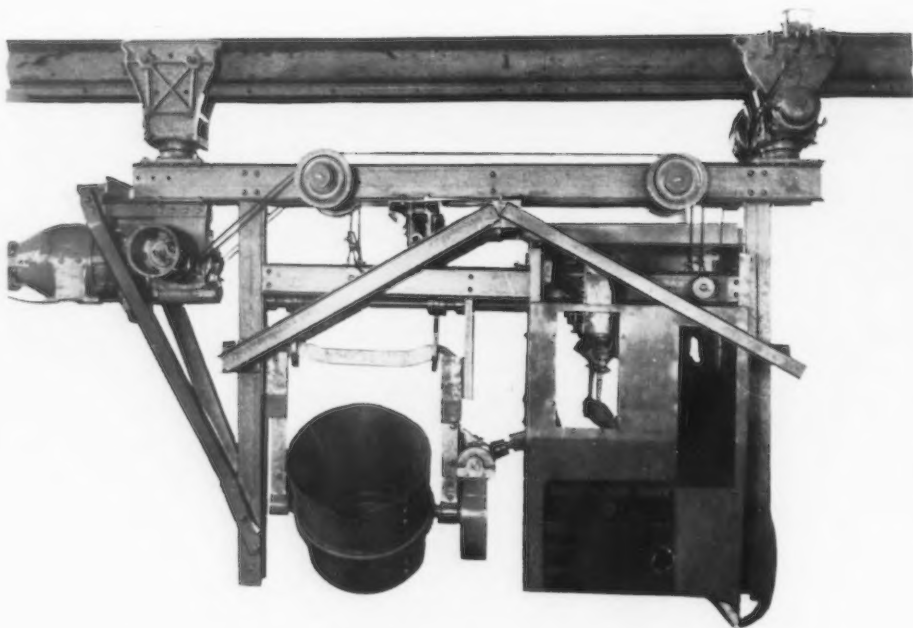
chine. As it is expelled, it first passes through a steel bar grate to eliminate coarse waste parts, and then through a vibrating wire screen for the elimination of the final waste parts. Thus thoroughly conditioned the sand is thrown into a pile, being thus cooled and aerated once more.

Refuse, eliminated at three separate points, falls to the floor to be readily disposed of. This machine is claimed to produce as much properly conditioned sand as two men can shovel into it. It can be easily moved from place to place and it is pointed to as ideal for filling bins and hoppers and for conveying sand from one location to another.



Hoisting and Carrying Equipment

TWO illustrations feature equipment recently developed by Shepard Niles Crane & Hoist Corporation, Montour Falls, N. Y. These are for use particularly in foundries, though the hoist shown is of more general application. A hot-metal carrier was designed particularly to take ladles of molten metal at high speed from the cupola to the foundry pouring floor. This keeps the iron hot. Pouring of the ladle may be done from the cab of the carrier. The trolleys are available for running on the bottom flange of I-beam runways or for other types of support. A monorail hoist



of unusual compactness is shown in the other picture. This embodies the same basic features of earlier designs, but is

built in interchangeable units, permitting different combinations of speed and power. Cooling fins at the left end provide extra radiating area. The load block is fully inclosed.



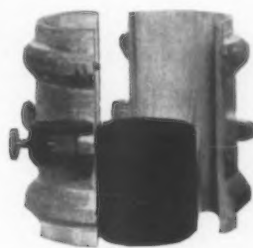


To Test the Hardness of Molds

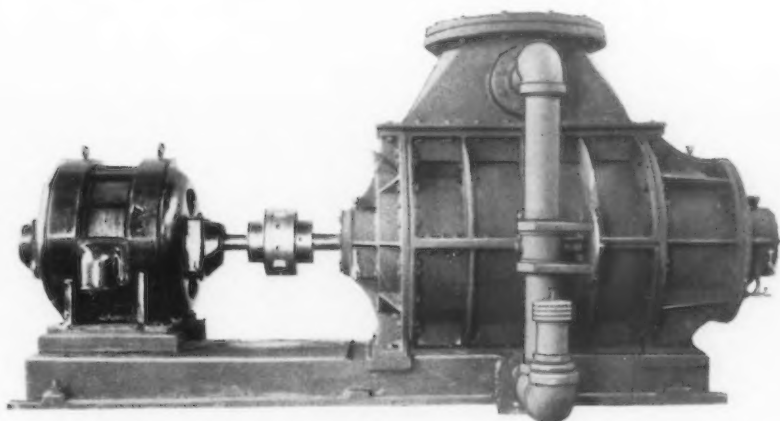
FOR testing the hardness of the surface of a mold, Harry W. Dietert, Detroit, has devised a small apparatus.

The device is pressed against the

mold surface and the penetration of the ball point is indicated on the dial. Soft-rammed molds read from 40 to 55, and hard-rammed molds from 75 to 80.



New High-Duty Cupola Blower



A NEW high-duty cupola blower is announced by the Wilbraham-Green Blower Co., Pottstown, Pa. This new type runs at a moderate speed with both the motor and the blower operating at the same speed. They are connected by means of a flexible coupling which does away with the old reduction gears.

A volume reducing and indicating mechanism enables the operator to vary the output of the blower in accordance with requirements. A dial indicates the amount of air going to the cupola and this amount remains constant throughout the heat until the operator wishes to change the setting.

Teapot Ladle with a Split Spout

A NEW teapot ladle with a split spout has been developed by the Whiting Corporation, Harvey, Ill. The difficulty of removing and maintaining the spout lining has been a disadvantage of teapot spout ladles. To overcome this the Harvey organization has designed a split spout ladle, as illustrated.

The spout is cast steel, split vertically, the two pieces being held together by key bolts. Only a few min-

utes are required to take out the bolts, remove the front half of the spout and make necessary repairs to the lining. Frequently, in the steel foundry, cold heats or delays cause the metal to freeze in the ladle, starting generally in the spout. With the split spout type the skull can be readily removed without affecting the lining of the ladle bowl proper. This spout can be relined many times to one lining of the bowl.



Twin-Pot Melting Unit

SOMETHING new in the way of aluminum melting furnaces is offered by the Kindt-Collins Co., Cleveland. The furnace, as illustrated, is manufactured in four sizes, the single-pot unit and the twin-pot unit. Both of these are made for a 30-lb. pot as well as a 50-lb. pot. Both are built with self-contained, motor-driven blowers. Where companies have their own compressed air, the blowers are furnished with a mixing valve. The fuel used is both artificial and natural gas.

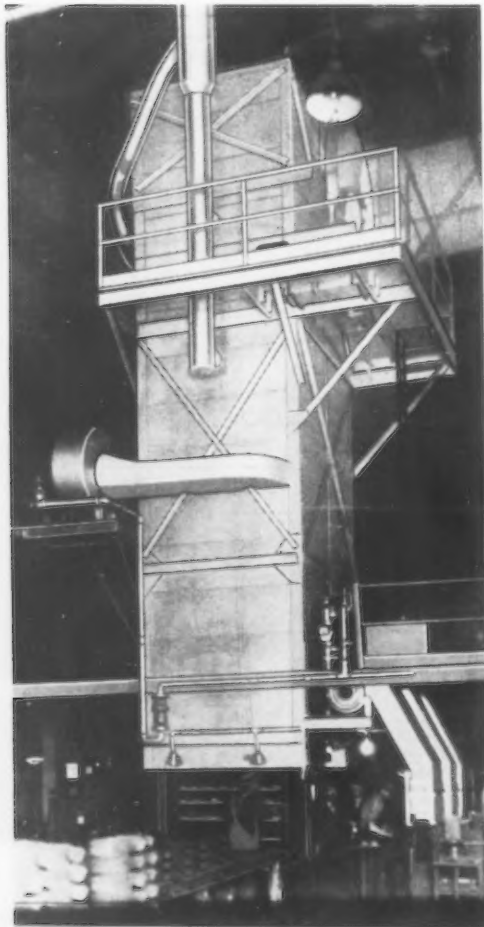


Continuous Vertical Conveyor Type Oven

THE conveyor type oven illustrated is one of three large continuous vertical ovens installed at the plant of the National Malleable & Steel Castings Co., Cleveland, by the Foundry Equipment Co., Cleveland. The ovens are approximately 40 ft. high with supports extending to the basement floor. The takeup and return pass are located in the basement which

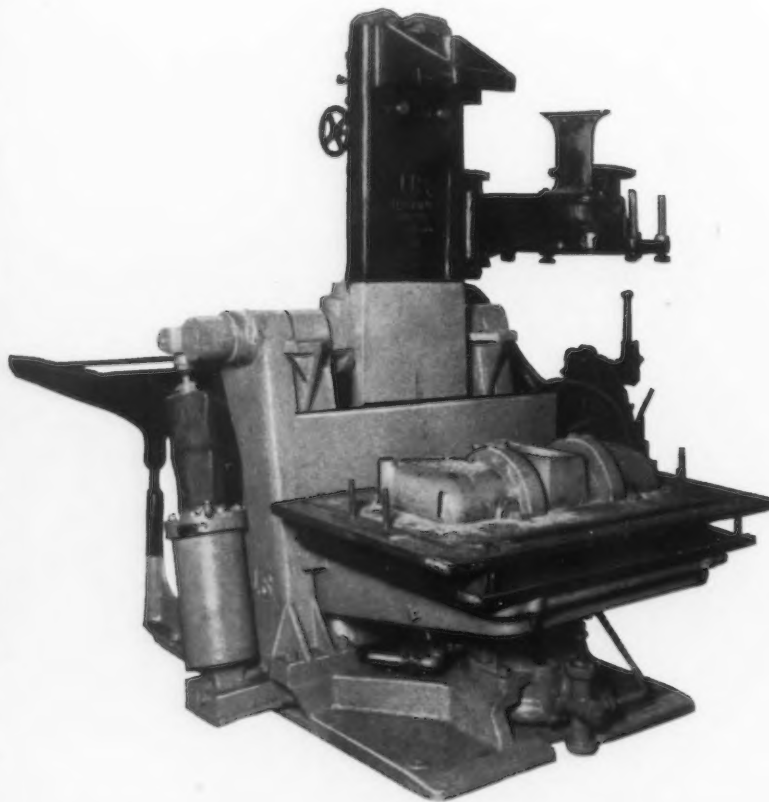
permits a loading passage-way through the oven.

Each oven contains 29 carriers, 2 ft. x 7 ft. with three shelves per carrier. The average cycle is 1 hr. 45 min., including cooling period within the oven. The ovens are fired with natural gas by means of a combustion chamber which may be readily adapted to oil firing.



A Jolt Rollover Mold Machine

A NEW machine, claimed to embody new principles, having an air clamp and air-leveling device and requiring no pit, has been brought out by the Johnston & Jennings Co., Cleveland. The illustration shows that it is of heavy construction, to withstand the most severe uses in the foundry. Several of these machines have been installed in some of the country's larger foundries. It is known as the jolt, rollover, pattern draw mold machine No. 918.



More Than 225 Foundry Exhibitors

Exposition of Equipment and Supplies at Convention of American Foundrymen's Association To Be Large

ALARGE and comprehensive exposition of foundry equipment and supplies will be a feature of the convention of the American Foundrymen's Association to be held in Cleveland May 12 to 16. More than 225 companies have taken exhibit space. Their names, booth numbers and lists of their representatives who will attend are given below:

A

Abrasive Co., Philadelphia. Booths 373-374.

In attendance: A. Dobson, sales manager; I. R. Blair, advertising manager; W. A. McMillan, W. H. Sharpe, J. H. Murphy.

Adams Co., Dubuque, Iowa. Booth 445.

In attendance: Philip Adams, John A. Cameron, John B. Meyer and William J. Spensley.

Advance Milling Co., Chicago. Booth 75.

Air Reduction Sales Co., New York. Booths 401, 402, 403.

Ajax Electrothermic Corporation, Trenton, N. J. Booth 201.

In attendance: G. H. Clamer, president; Dr. E. F. Northrup, vice-president and technical adviser; Dudley Willcox, treasurer and assistant general manager; A. Dean Meyer, metallurgical engineer; G. F. Applegate, shop superintendent; Robert N. Blakeslee, Jr., secretary and sales manager.

Ajax Metal Co., Philadelphia. Booths 201, 203, 204, 205, 206.

In attendance: G. H. Clamer, president and general manager; William J. Coane, first vice-president and sales manager; Frank M. Willeson, Zeno D. Barns, Roger Keeley, William Adams, Henry Gelseke.

Albany Sand & Supply Co., Albany, N. Y. Booth 64.

In attendance: Lawrence Murray, M. J. Slater and B. L. Chamberlain.

Alloys & Products, Inc., New York. Booth 14.

In attendance: Henry Hecht, president; Frank J. McCaul, assistant treasurer; Charles Vickers, Gilbert T. Mason, Edward E. Berliner.

American Brake Shoe & Foundry Co., Chicago. Booth 59.

In attendance: C. P. Wright, vice-president; V. G. Bates, W. S. Cumming.

American Engineering Co., Aramingo Ave. and Cumberland St., Philadelphia. Booth 477.

In attendance: J. G. Worker, J. S. Neisser, H. R. Lukens, H. S. Thoennebe, W. E. Weghorst, A. T. Fisher, H. Barney, L. M. Colwell, H. E. Ruhf, C. F. Florandin, H. C. Sturman, F. B. Menwer, S. R. Vanderbeck, H. A. Neft, C. W. Schroeder and C. DeV. Miller.

American Foundry Equipment Co., Mishawaka, Ind. Block I and Booth 552.

In attendance: Verne E. Minich, John S. Sammons, Hutton H. Haley, J. D. Alexander, C. B. Schneible, R. S. Judah, L. D. Pelk, Jerome E. Sweet, E. J. Turnbull, James Rigby, C. L. Benham, F. G. Schultz, L. B. Kerr, A. H. Freeman, Charles Rose, J. V. Gaebler, C. H. Lungren and R. J. Hutchinson.

American Gum Products Co., 230 Park Avenue, New York. Booth 91.

In attendance: Gordon I. Lindsay, B. W. Bullen, T. J. Ryan, T. J. O'Hara and J. A. Smith.

American MonoRail Co., 13107 Athens Avenue, Cleveland. Booths 261, 263, 265.

In attendance: J. P. Lawrence, L. E. Gaston, M. E. Hartzler, J. C. Roth,

H. L. Stetser, F. N. Willyard, W. P. Amick, S. J. Woodward, H. M. Miller and F. C. Harris.

American Steel Abrasives Co., Galion, Ohio. Booth 411.

In attendance: Paul McConnell, secretary.

Apex Smelting Co., 2554 Fillmore Street, Chicago. Booth 23.

In attendance: W. A. Singer, Louis Lipka, G. H. Starmann and E. Muller.

Arcade Mfg. Co., Freeport, Ill. Booths 257, 259.

In attendance: L. L. Munn, president; B. C. Trueblood, vice-president and treasurer; Mentor Wheat, sales manager; Vance Firestone, August Christen, Herman Kasten, R. E. Turnbull, G. D. Wolfley, Maurice Brown.

Asbury Graphite Mills, Asbury, N. J. Booth 439.

In attendance: H. M. Riddle, Sr., president; H. M. Riddle, Jr., vice-president and general manager; J. E. Peterson, mid-west sales manager; Roy Kellogg, Los Angeles.

Atlas Car & Mfg. Co., Cleveland. Booths 313, 315.

Austin Co., Cleveland. Booth 30.

In attendance: H. E. Eiber, assistant to vice-president; R. Leavenworth, assistant general sales manager; A. H. Meyer, advertising manager; L. E. Cooney, assistant sales manager; W. G. Paton, G. A. Metzger, L. M. Druckenbrod, N. L. Palmer, T. Catchpole, J. T. Leonard, E. M. Richardson, R. J. Stickle, S. A. Miller.

Automatic Transportation Co., Buffalo. Booths 482, 484.

In attendance: Russell J. Mulholland, general sales manager; George Hush, Jr., Cleveland; Malcolm Nesbit, Pittsburgh.

Ayers Mineral Co., Zanesville, Ohio. Booth 5.

In attendance: E. M. Ayers, president; J. A. Crew, metallurgist; R. G. Hay, sales manager; Lon Kimball.

B

Black & Decker Mfg. Co., Towson, Md. Booths 535 to 543.

In attendance: W. C. Allen, sales manager; T. H. Belling, assistant sales manager; R. D. Black, advertising manager; C. C. Watts, J. A. Fairfield, Guy Coffey, William Fenwick, Luke Boyd, H. B. Mecaslin.

Baker-Raulang Co., 2168 W. 25th Street, Cleveland. Booth 444.

In attendance: A. J. Gates, B. C. Hooper, C. H. Warren, E. I. Walsh, G. E. Guy, C. H. Remoe, E. H. Remoe, B. F. Stoner, H. C. Schultz, E. W. Sankey and E. J. Bartlett.

C. O. Bartlett & Snow Co., Cleveland. Booths 306, 308 and 310.

In attendance: H. S. Hersey, H. L. McKinnon, M. E. First, H. C. Orr, W. J. Fruechtel and Oliver S. Kelly.

H. L. Baumgardner Mfg. Corporation, Fremont, Ohio. Booths 493, 495.

In attendance: J. B. Skelly, secretary-treasurer, H. L. Baumgardner, C. W. Yeager, O. Coe, T. Gassman, F. S. Mangan and J. M. Morrow.

Bausch & Lomb Optical Co., Rochester, N. Y. Booth 94.

In attendance: I. L. Nixon, M. H. Stevens, T. L. Bourne and H. L. Shippy.



Beardsley & Piper Co., 2541 N. Keeler Avenue, Chicago. Booth 44.

In attendance: E. O. Beardsley, W. F. Piper, E. O'Connor.

Bethlehem Steel Co., Bethlehem, Pa. Booths 2 and 29.

In attendance: D. A. Barkely, manager of sales; R. H. Lee, G. A. Cushman, F. E. Fisher, J. F. Gaffney, H. Hibshman, W. Flood, W. L. Lippincott, G. Simpson, W. B. Pritchard, G. A. Oyer.

Biax Flexible Shaft Co., Inc., 20 East Seventeenth Street, New York. Booths 440 and 442.

In attendance: H. T. Stroh, sales engineer; F. I. VanderBeek, vice-president; R. Wezel, G. M. VanderBeek and K. Vought.

Blaw-Knox Co., Pittsburgh. Booth 11.

In attendance: W. W. Cochrane and H. B. Fuller.

Blystone Mfg. Co., Cambridge Springs, Pa. Booth 538.

In attendance: Luther G. Conroe, general manager; W. I. Kaufman, superintendent.

Box Crane & Hoist Corporation, Philadelphia. Booths 251 and 253.

In attendance: G. A. Mitchell, secretary and sales manager; R. A. S. Johnson, Chicago; J. F. Bruce, Cleveland.

Bradley Washfountain Co., 2203 Michigan Street, Milwaukee. Booth 231.

In attendance: H. P. Seidel, H. L. Walters, H. A. Mullett and G. D. Coon.

British Aluminum Co., Ltd., New York. Booth 62.

In attendance: Arthur Seligman, Arthur Jellinek, A. J. Field.

Buckeye Portable Tool Co., Dayton, Ohio. Booth 501.

In attendance: W. W. Price, president; W. R. Gummere, H. O. Gummere, C. F. Overly.

Buckeye Products Co., Cincinnati. Booth 502.

In attendance: Arthur Hoffheimer, vice-president; Charles Wise, secretary; A. J. Laforet.

Bullard-Davis, Inc., 67 Wall St., New York. Booth 79.

In attendance: E. H. Lyons.

C

Campbell-Hausfeld Co., Harrison, Ohio. Booth 497.

In attendance: J. S. Armour, sales manager, and E. B. Hausfeld, secretary.

Carborundum Co., Niagara Falls, N. Y. Booths 476 and 478.

In attendance: S. F. Courter, G. W. Chormann, B. H. Work, H. E. Kerwin, O. C. Dobson, R. Rainnie and J. C. Rice.

Carborundum Co., Perth Amboy, N. J. Booth 480.

In attendance: W. H. Fitch, sales manager, recuperator department; S. A. Fenno, district sales manager, R. A. Barr, sales engineer; W. C. Thiess, sales engineer.

Chain Belt Co., 736 Park Street, Milwaukee. Booths 529 and 530.

In attendance: W. B. Marshall, J. C. Merwin, C. F. Messinger, Brinton Welser, F. A. Pampel, H. S. Greene, F. H. Kau, E. M. Handley and G. K. Viall.

Champion Foundry & Machine Co., Chicago. Booth 415.

In attendance: H. O. Magnuson.

Frank D. Chase, Inc., Chicago. Booth 34.

In attendance: Frank D. Chase, president; Harold Ambler, vice-president; J. N. Richardson, foundry engineer.

Chateaugay Ore & Iron Co., 26 Liberty Street, New York. Booth 48.

In attendance: J. R. Linney, E. J. Burnes, M. Prosser and C. Kaiser.

Chicago Crucible Co., Chicago. Booth 60.

Chisholm-Moore Hoist Corporation, Tonawanda, N. Y. Booths 542 and 544.

In attendance: F. W. Shaw, W. H. Morgan, E. N. Turner, A. S. Remsberg and D. S. Brisblin.

Clark Trutractor Co., Battle Creek, Mich. Booth 560.

In attendance: R. J. Burrows, president; C. E. Staninger, Everett M. Sharp, C. I. Ucker.

Clearfield Machine Co., Clearfield, Pa. Booths 486, 488.

In attendance: F. B. Reed, president; W. E. McMurray, chief engineer; J. M. Gallaher, sales manager; P. P. Reece, sales department; P. B. Reed, general manager.

Cleveland Crane & Engineering Co., Wickliffe, Ohio. Booth 309.

In attendance: W. C. Heinle, R. E. Ludwick, H. T. Florence, William G. Wehr, A. C. Garnett, F. H. Gill, C. H. Salter, W. F. Double, A. J. Judge, H. Cotesworth and George S. Florence.



Cleveland Electric Tramrail Division, Wickliffe, Ohio. Booths 352 to 355.

In attendance: E. T. Bennington, A. F. Anjeskey, J. R. Booher, K. R. Weise, A. F. Carl, M. G. Rosenthal, Robert G. Birkin, A. E. Creasy, J. T. Lewis, Jr., Harry Haggett, C. A. Blake and J. B. Forker.

Cleveland Flux Co., Cleveland. Booth 19.

In attendance: Kirke H. Baum, president; Charles D. Pinkerton, vice-president; Clifford B. Cornell, secretary and treasurer; S. E. Moss, assistant secretary; J. A. Maxwell.

Cleveland Wire Spring Co., Cleveland. Booth 413.

In attendance: Ralph J. Poole, A. T. Soden, Charles C. Klingman and Charles Erickson.

Clipper Belt Lacer Co., Grand Rapids, Mich. Booth 15.

In attendance: Earl H. Forsyth and Wylie K. Lee.

Combined Supply & Equipment Co., Inc., Buffalo. Booth 101.

In attendance: Stephen LeViness and Everett LeViness.

Corn Products Refining Co., New York. Booth 61.

In attendance: F. G. Faller, Harry A. Crown, William T. Maguire, Al Kreischer, J. M. Milliken, Herman Knubbe, William T. Dougherty, Peter Dapkus.

John L. Cummings Co., St. Joseph, Mich. Booth 540.

In attendance: J. L. Cummings and S. L. Davis.

D

Dayton Oil Co., Dayton, Ohio. Booth 33.

In attendance: D. S. Hopping, president; G. A. Storer, W. C. Clark, S. N. Dykstra.

Dayton Pneumatic Tool Corporation, Dayton, Ohio. Booth 414.

In attendance: E. C. George, assistant sales manager; H. W. Leighton, Western district sales manager.

Deister Concentrator Co., Fort Wayne, Ind. Booth 550.

In attendance: Don A. Weber, general manager; C. W. Fugate, J. J. Welch.

William Demmler & Brothers, Kewanee, Ill. Booth 447.

In attendance: H. L. Demmler, president; J. N. Demmler, secretary; F. A. Demmler, Charles Eshelman.

Detroit Electric Furnace Co., Detroit. Booth 241.

In attendance: E. L. Crosby, A. E. Rhoads, L. T. Crosby, L. C. Wilson, G. R. Jackson, C. H. Morken and M. J. Crowley.

Harry W. Dietert, Detroit. Booths 430, 432.

In attendance: Harry W. Dietert, manager; Jack Goldstein, Herman Cooper, Charles Seman.

Joseph Dixon Crucible Co., Jersey City, N. J. Booth 290.

In attendance: R. R. Belleville, R. F. Leonard, J. E. Thomas, F. R. Brandon, P. H. Griffin and H. Eichwald.

J. E. Dockenforff & Co., Inc., New York. Booth 22.

In attendance: W. S. Hamnett, general manager.

Drying Systems, Inc., Chicago. Booth 404.

In attendance: C. H. Currier, R. E. Lippert, T. E. Humphrey, B. B. Russell and H. Kolben, Jr.

E

Eastern Clay Products, Inc., Buffalo. Booth 92.

In attendance: S. H. Cleland, R. L. Cleland, N. J. Dunbeck, R. C. Halliday, E. B. Norris, A. J. Heysel and J. Erler.

D. A. Ebinger Sanitary Mfg. Co., Columbus, Ohio. Booth 108.

In attendance: H. H. Leukart, A. G. Peterson, A. E. Smith and R. H. Evans.

Electric Storage Battery Co., Philadelphia. Booth 454.

In attendance: H. F. Sauer, W. M. Ely, G. V. Cripps, W. V. Mussen, W. G. Chaney, E. C. Kline.

Electro-Chemical Pattern & Mfg. Co., Detroit. Booth 66.

In attendance: Arthur K. Laukel, president, and John H. Laukel, vice-president.

Electro Refractories Corporation, Buffalo. Booth 83.

In attendance: L. U. Milward, D. B. Milward, G. S. Diamond and T. W. Campbell.

El-Roy Sand Conditioner Distributors, Wilkes-Barre, Pa. Booths 238-239.

In attendance: E. S. Royer and R. J. O'Donnell.

F

Fanner Mfg. Co., Cleveland. Booth 81.

In attendance: J. R. Raible, president; C. G. Raible, vice-president; F. W. Beck, sales manager; P. D. McDonnell, foundry superintendent; S. H. Gibson, general superintendent; E. H. Schane.

Federal Foundry Supply Co., Cleveland. Booths 39-41.
In attendance: Ralph Ditty, L. H. Heyl, Elmer Ditty, T. H. Terry, T. J. Brown, W. F. Haggman, George H. Donoghue, O. E. Peterson, George A. Fuller, G. E. Snedeker, Harry Donald and Walter Gerlinger.

Ferro Enamel Supply Co., Cleveland. Booth 53.
In attendance: Paul V. Blackburn, Robert A. Weaver and C. A. Dutton.

Foundry Equipment Co., Cleveland. Booths 216, 217, 218.
In attendance: C. A. Barnett, president; O. D. Conover, vice-president; C. F. Mayer, vice-president, H. W. Steindorf, chief engineer; C. J. Pimsner, M. A. Beltaire, Jr., C. M. Holcomb, E. J. Welter, E. N. Walton.

Fowler & Union Horse Nail Co., Buffalo. Booth 18.
In attendance: Charles A. Reamer.

Cyril A. Fox, Pittsburgh. Booths 226 to 230.
In attendance: Cyril A. Fox, Roy Simonson, Arthur Mennell, Joseph Shull and H. S. Stockdale.

G

General Electric Co., Schenectady, N. Y. Booths 532-533.
In attendance: H. V. Crawford and T. H. Reeves.

General Electric X-Ray Corporation, Chicago. Booth 82.
In attendance: E. W. Page.

Globe Steel Abrasive Co., Mansfield, Ohio. Booth 546.
In attendance: C. H. McConnell, manager.

Great Lakes Foundry Sand Co., Detroit. Booth 93.
In attendance: John D. Cronenweth, president; William J. Muhltnr, vice-president and general manager; Neil I. McArthur, secretary and sales manager; James G. Mendenhall, treasurer; Y. A. Dyer, consulting metallurgist, Hammond Iron Co.; H. P. Mackinnon, Mason B. Giberson, Sr., Earl L. Smitherman, Edward J. Gutsche, Phil E. Giberson, Henry J. Piehl, H. M. Lane.

Great Western Mfg. Co., Leavenworth, Kan. Booth 449.

Griffin Engineering Co., Chicago. Booth 52.
In attendance: J. W. Hurley, chief engineer; J. J. Boland.

Grindle Fuel Equipment Co., Harvey, Ill. Booth 304.
In attendance: W. R. Bean, president; M. F. Becker, general manager; C. R. Taylor, R. J. Bender, J. E. Charles, E. H. Nielsen.

H

Harnischfeger Sales Corporation, Milwaukee. Booths 243 and 245.

In attendance: W. Harnischfeger, E. Standfuss, N. P. Farrar, H. H. Erkelenz, A. J. Dreyer, Charles Siegle, A. F. Genthe, F. Lieblich and R. J. Wadd.

Harrington Co., Philadelphia. Booth 358.

R. G. Haskins Co., Chicago. Booth 412.
In attendance: F. A. Latham, F. A. McKee, R. G. Haskins and H. Goldberg.

Hayward Co., New York. Booths 298-291.
In attendance: H. S. Atkinson, C. S. Sargent and E. J. Robeck.

Herman Pneumatic Machine Co., Pittsburgh, Pa. Booths 312, 314, 316.

In attendance: Thomas Kaveny, president; A. G. Doyle, vice-president; Richard Harris, secretary; Robert F. Ringle, works manager; I. J. Oesterling, assistant works manager; Thomas Kaveny, Jr., mechanical engineer; R. P. Morgan, C. W. Miller, C. S. McMath, L. L. Johnston, Robert M. Porteous, W. W. Hughes, Joseph W. Gibson, Milton W. Heyl, Alfred Herman, Clarence Shorts.

Hill & Griffith Co., Cincinnati. Booth 16.

In attendance: John Hill, president; Bruce Hill, vice-president; William Oberhelman, vice-president; W. J. Adams, J. A. Reeves, M. Geier, C. L. Gysin, F. McCarthy.

Hines Mfg. Co., Cleveland. Booths 493-495.

In attendance: James F. Hines, R. J. Hines, W. B. Hines and T. J. Malone.

Hisey-Wolf Machine Co., Cincinnati. Booths 417-418.

In attendance: John W. Friedlander, Roy D. Haworth, W. A. Marschke, Geo. Moerlein, P. A. Rebok, Emil Ritz and H. W. Wallace.

Holcroft & Co., Detroit. Booth 12.

In attendance: C. H. Martin, Chicago district manager; L. M. Lindsey.

Hougland & Hardy, Evansville, Ind. Booth 10.

In attendance: C. M. Hardy, president; K. O. Johnson, L. B. Osborn.

I

Illinois Clay Products Co., Joliet, Ill. Booth 63.

In attendance: Otis C. Jones, president; A. S. Nichols, sales manager; L. E. Everett, S. K. Minton, L. B. Knight.

Illinois Testing Laboratories, Inc., Chicago. Booth 100.

In attendance: J. A. Obermaier and M. D. Pugh.

Industrial Minerals Co., Columbus, Ohio. Booth 4.

In attendance: H. N. Rose, manager; W. G. Edwards.

Industrial Silica Corporation, Youngstown. Booth 46.

In attendance: E. E. Klooz, president; J. S. Coxey, Jr., vice-president in charge of sales; Harry H. Smith, research engineer; C. F. Eberhart, J. Edward Ruch, F. R. Thrall.

International Molding Machine Co., Chicago. Booths 281, 283, 285, 287.

In attendance: Edward A. Pridmore, president; W. W. Miller, vice-president; Harold E. Pridmore, Lawrence D. Pridmore, E. G. Borgnis, Hugh Gallagher, W. J. Monahan, W. J. Rowley, Luke S. Shannon, J. C. Kingsland, Charles H. Ellis, W. J. Briggs.

International Nickel Co., New York. Booths 104 and 106.

In attendance: T. H. Wickenden, F. B. Coyle, J. S. Vanlick, H. J. French, T. J. Wood, R. L. Suhl, R. A. Wheeler, R. Cooper, Jr., W. C. Kerrigan and E. J. Bothwell.

Iron Age Publishing Co., New York. Booth 68.

In attendance: F. J. Frank, W. W. Macon, E. F. Cone, E. E. Thum, S. G. Koon, R. E. Miller, R. A. Fiske, F. L. Prentiss, C. S. Baur, H. E. Leonard, O. Johnson, B. H. Hayes, F. S. Wayne, W. B. Robinson, Emerson Findley, C. Lundberg, B. L. Herman, Peirce Lewis, D. C. Warren, W. C. Sweetser, C. H. Ober and A. H. Dix.

Ironton Fire Brick Co., Ironton, Ohio. Booth 28.

In attendance: E. F. Myers, president; C. E. Bales, vice-president; H. W. Walters, C. E. Von Lührte, David H. Houston, A. H. Beeman.

J

Johnston & Jennings Co., Cleveland. Booth 446.

In attendance: T. J. Calhoun, president; J. L. Battenfeld, sales engineer; R. W. Gramlin, sales engineer; J. C. Brainard, secretary.

W. A. Jones Foundry & Machine Co., Chicago. Booths 460-463.

In attendance: W. H. Ostring, W. C. Cureton, W. F. Coleman and W. G. Jones.

K

Charles C. Kawin Co., Chicago. Booth 73.

In attendance: Charles C. Kawin, president; John Tissing, vice-president; William H. Griner, William S. Miller, Charles V. Edwards, William L. Heppner.

Keener Sand & Clay Co., Columbus, Ohio. Booth 47.

In attendance: C. P. Helmick, president; E. M. Durstine, secretary.

Spencer Kellogg & Sons Sales Corporation, Buffalo. Booths 70 and 95.

In attendance: A. P. Mason, W. L. Goetz, J. N. Yaeger, E. G. Allen, E. A. Medbery, E. E. Sutehall and L. W. Gerrard.

Kelly Graphite Mills, Inc., Stockertown, Pa. Booths 553, 554.

In attendance: V. C. Smith, vice-president and general manager; B. F. Wallace, director of research; F. W. Hamel, H. W. Stead, H. C. Seidel, T. N. Ryan.

Kindt-Collins Co., Cleveland. Booth 491.

In attendance: E. T. Kindt, president; O. Helsterkamp, F. J. Sherwin.

Kling Brothers Engineering Works, Chicago. Booths 226-230.

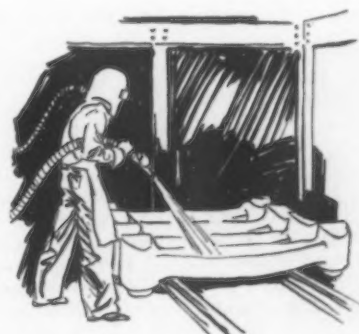
In attendance: O. E. Kling, H. J. Aagaard and P. E. Kling.

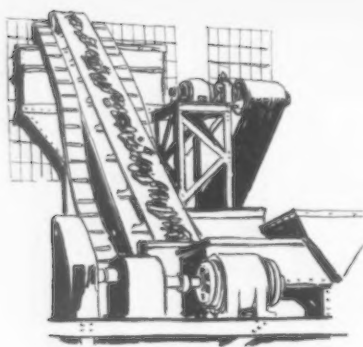
Kneffer-Bates Co., Indianapolis. Booth 49.

In attendance: George B. Hill, sales manager; Herbert J. Bever, John A. Green, H. H. Hollowell.

H. W. Knight & Son, Seneca Falls, N. Y. Booth 51.

In attendance: H. D. Knight.





H. Kramer & Co., Chicago. Booth 42.
In attendance: I. Kaden, vice-president; L. Chapman, vice-president; S. Marks, vice-president; Wm. Romanoff, technical superintendent; C. O. Thieme, metallurgist; F. F. Heymann, B. P. Cooke, Wm. C. Yenger.

Charles A. Krause Milling Co., Milwaukee. Booth 38.

In attendance: S. H. Werner, Guy E. Lund, H. D. Farris and B. Y. Leslie.

L

Lava Crucible Co. of Pittsburgh, Pittsburgh. Booth 72.

In attendance: Furman South, Jr., president; Harold E. White, vice-president; D. E. MacLean, secretary; R. P. South, C. H. Knappenberger, W. T. Gardner.

Linde Air Products Co., New York. Booths 555 and 556.

In attendance: W. I. Gaston, H. H. Dyar, A. A. Markee, A. T. Post, E. J. Stark, J. Hemmerlein and P. C. Sloane.

Lindsay-McMillan Co., Milwaukee, Wis. Booth 56.

In attendance: William A. McMillan, president; William R. Pate, vice-president; J. A. Gitzen, R. G. Walker, M. A. Pollard, Zeno LeTellier.

Link-Belt Co., Chicago and Philadelphia. Booths 256 and 258.

In attendance: W. L. Hartley, foundry engineer, Chicago; Harold Hoffmann, foundry engineer, Chicago; R. J. Heisserman, foundry engineer, Philadelphia; N. L. Smith, foundry engineer, Philadelphia; L. O. Spillan, engineer, Chicago; P. V. Wheeler, engineer, Cleveland; M. H. Kidder, advertising department, Chicago.

Louden Machinery Co., Fairfield, Iowa. Booths 250, 252, 254.

In attendance: R. Bruce Loudon, Lee F. Berthold, Charles C. Martin, C. W. Johnson, W. J. Schwerman, Philip McCain, E. H. Seelbach, A. R. Saborsky and H. Marete.

Lowe Mfg. Co., Detroit. Booth 527.

In attendance: Robert G. Lowe.

M

J. S. McCormick Co., Pittsburgh. Booths 534, 536, 538.

In attendance: J. S. McCormick, president; H. T. Herr, Jr., vice-president; Frank J. Buerger, secretary; H. D. Fowler, J. W. Early, C. C. Bumbaugh, H. J. Winters.

R. W. McIlvaine Co., Chicago. Booth 438.

In attendance: R. W. McIlvaine, R. L. McIlvaine, A. A. Ross and W. A. Forbes.

Macleod Co., Cincinnati. Booths 483 and 485.

In attendance: James Lauder, engineer.

Paul Maehler Co., Chicago. Booths 375 and 376.

In attendance: A. E. Maehler, general manager; H. R. Madson, H. M. White, H. R. Fox, R. C. Schwarz.

Mall Tool Co., Chicago. Booth 498.

In attendance: A. W. Mall and F. E. Kilbourn.

Malleable Iron Fittings Co., Branford, Conn. Booth 481.

In attendance: G. B. Pickop, Raymond Wright and Roger Gustafson.

Manhattan Rubber Mfg. Division, Abrasive Wheel Department, Passaic, N. J. Booths 226 to 230.

In attendance: W. H. Steinberg and C. A. Fox.

Marschke Mfg. Co. (Division of Black & Decker Mfg. Co.), Towson, Md. Booths 535 to 543.

In attendance: H. B. Mecaslin, G. J. Coffey, W. J. Fenwick, L. M. Boyd and J. A. Fairfield.

Mathews Conveyor Co., Ellwood City, Pa. Booth 318.

In attendance: F. E. Moore, W. L. Dean, J. H. Hough, M. J. Anderson, C. A. Adams, A. B. Evans, C. P. Kumler, F. L. Grady and Jason Smith.

Michigan Screw Co., Lansing, Mich. Booth 456.

In attendance: George O. Lundberg.

Michigan Smelting & Refining Co., Detroit. Booth 54.

In attendance: Henry Levitt, vice-president; R. R. Arnold, sales manager; C. B. Bloomgarden, factory manager; T. W. Kuhn, R. T. Bloomquist, A. M. Watson, H. L. Phillips.

H. E. Mills Mfg. Co., Syracuse, N. Y. Booth 76.

In attendance: J. R. Webster, vice-president and general manager; E. E. Grady and Thomas Killan.

Milwaukee Electric Crane & Hoist Corporation, Milwaukee. Booths 243 and 245.

In attendance: D. B. Patterson, general manager; C. L. Mayer, sales manager; H. S. Strouse, advertising manager; G. L. Drake, assistant manager hoist sales; T. P. O'Neil, E. B. Kapke.

Milwaukee Foundry Equipment Co., Milwaukee. Booths 223, 224.

In attendance: H. E. Fellows, sales manager; L. E. Gregory, C. G. Jurack, T. J. Magnuson, H. W. Bowers, N. M. Stuart.

Modern Pouring Device Co., Port Washington, Wis. Booths 487 and 489.

In attendance: M. W. Goldberg, W. W. Drissen, F. J. Welter, W. J. Knappe and E. M. Goldberg.

Moline Iron Works, Moline, Ill. Booth 450.

In attendance: B. V. Nutt, vice-president.

Moltrup Steel Products Co., Beaver Falls, Pa. Booth 1.

In attendance: J. T. Moltrup, J. F. Moltrup, J. M. Lithgow, D. C. Russell, O. H. Campbell, F. F. Ward and H. O. Zuber-buhler.

Monarch Engineering & Mfg. Co., Baltimore. Booths 292, 294.

In attendance: William Chenoweth, superintendent; Harry D. Harvey, treasurer; James V. Martin, William Raber, Harold L. Harvey.

Mt. Jewett Fire Clay Co., Mt. Jewett, Pa. Booth 452.

In attendance: E. M. O'Neill, A. F. Shaffer and R. J. Weiser.

N

National Engineering Co., Chicago. Booths 280 to 288.

In attendance: H. S. Simpson, president; S. T. Johnston, vice-president; T. Kauffmann, treasurer; T. S. Hammond, vice-president; A. G. J. Rapp, in charge of engineering; B. Castor, master mechanic; W. H. Schulte, erecting engineer; A. C. Christensen, engineer; C. D. Hollins, sales manager; W. C. Packard, C. J. Skeffington, W. A. Kellogg, W. C. Edgar, G. G. Crewson, A. E. Smith.

National Smelting Co., Cleveland. Booth 78.

In attendance: R. L. Brown, E. S. Christiansen, A. Rubin, P. Schomer, W. M. Weil.

Newaygo Engineering Co., Newaygo, Mich. Booths 529 and 530.

In attendance: W. J. Bell, E. N. Hanlon, C. R. Walcott, B. J. Frenzer and W. H. Slaughter.

New Haven Sand Blast Co., New Haven, Conn. Booths 490, 492, 494.

In attendance: Donald S. Sammis, general manager and treasurer; S. Sherwood Parsons, Western sales manager; Laurence Thompson, Robert Wisely, H. C. Nicholas, L. B. Brewster, F. C. Morey.

New Jersey Silica Sand Co., Millville, N. J. Booth 71.

In attendance: Clarence R. Wolf, Jack Hallard and Clarence Thompson.

Niagara Falls Smelting & Refining Corporation, Buffalo. Booth 84.

In attendance: E. G. Jarvis, J. M. Jarvis, S. Frankel, W. T. Godard, W. A. Sharp, G. B. Michie and Pearl Mendenhall.

William H. Nicholls Co., Inc., Richmond Hill, N. Y. Booths 260, 262, 264.

In attendance: William H. Nicholls, president; Hiram L. Ritts, vice-president; Louis R. Schocken, secretary; Dominic Petrocilli, Arthur D. Ziebarth, G. Anderson.

North American Refractories Co., Cleveland. Booth 107.

Northern Engineering Works, Detroit. Booth 428.

In attendance: Henry W. Standart, president; Louis H. Olf, secretary; C. W. Davis, chief engineer; W. W. Peattie, S. E. Schneider.

Norton Co., Worcester, Mass. Booths 211 to 214.

In attendance: A. R. Sandine, R. H. Cannon, F. P. Hayes, Jr., G. A. Park and F. H. Stenberger.

O

S. Obermayer Co., Chicago. Booth 255.

In attendance: Theodore Kauffmann, president; S. T. Johnston, vice-president; E. D. Frohman, vice-president; Theodore Kauffmann, Jr., manager refractory division; F. B. Flynn, sales manager; W. R. Cummings, W. C. Samuels.

Oilless Core Binder Co., Cleveland. Booth 496.

In attendance: J. H. Bruce, president; J. A. Hamilton, vice-president; H. A. Baker, secretary and treasurer; H. B. Fischer, Larry Wilson, George Wehring and M. P. Gallagher.

Oliver Machinery Co., Grand Rapids, Mich. Booths 240-248.

In attendance: A. S. Kurkjian, general sales manager; H. B. Tuthill, plant manager; F. Conibear, Henry E. Brasseur, J. R. Duthie, B. W. Middleton, C. R. Crossley, C. A. Ginter, J. E. McLauchlen, G. C. Conklin, G. W. Crosley.

Osborn Manufacturing Co., 5401 Hamilton Ave., Cleveland. Booths 330-339, 367, 368 and 369.
In attendance: F. G. Smith, M. W. Zeman, R. W. Hisey, E. F. Oyster, J. D. Wise, E. T. Doddridge, F. T. Spikerman, R. E. Kiefer, H. B. Klar, G. G. Adam, R. C. Miller, R. F. Lincoln, Ward Dougherty, H. T. Preston, L. F. Miller, M. K. Rear and E. A. Blake.

P

Paket Alloys, Inc., New York. Booth 479.
In attendance: Hugh Charles Sicard, Robert Turnbull and A. von Frankenberg.

Palmer-Bee Co., Detroit. Booth 545.
In attendance: J. E. McBride, vice-president and chief engineer; D. B. Hill, manager; H. M. Shuman, W. V. Sestok, R. F. Barnes and F. Fones.

Pangborn Corporation, Hagerstown, Md. Booths 320-327.
In attendance: Thomas W. Pangborn, John C. Pangborn, P. J. Potter, F. J. Hull, W. A. Rosenberger, H. D. Gates, C. A. Boultsman, M. I. Dorfan, A. M. Oliver, Harold Holden, W. C. Lytle, J. J. Carr, C. T. Bird, R. M. Trent, L. W. Wagner, W. T. Randall, F. E. Wolf, B. R. Artz and E. C. Gilmour.

Patch-Wegner Co., Rutland, Vt. Booth 433.
In attendance: Fred Coughlin, W. J. McGarry and James Meldrum.

Peerless Sand Co., Conneaut, Ohio. Booth 43.
In attendance: F. L. Moore, president and general manager; C. E. Moore, vice-president.

Pennsylvania Lubricating Co., Pittsburgh. Booth 80.
In attendance: John M. Lutz, general sales manager; G. R. Meyers, manager core oil department; L. M. Hickson, advertising manager; H. J. Strassberger, H. P. Bittinger, G. H. Brinkmeyer, C. N. Wolgamood, G. F. Morgan, F. R. Johlle, R. B. Bedford, R. G. Blakeley.

George F. Pettinos, Inc., Philadelphia. Booth 32.
In attendance: George F. Pettinos, president; George A. Doughten, secretary and treasurer; J. H. Hatten, D. S. Yeomans, J. R. Cooney, E. G. Stratton, T. H. Walker and F. H. Goodfellow.

Pickands, Brown & Co., 332 South Michigan Avenue, Chicago. Booth 69.
In attendance: S. S. Robinson, G. A. T. Long and C. M. Pearson.

Pittsburgh Electric Furnace Corporation, Pittsburgh. Booths 328, 329.
In attendance: W. B. Wallis, president; W. E. Lewis, assistant sales manager; W. E. Moore, H. H. Watson, G. L. Simpson, W. H. Payne, F. E. Gibson, Presley Hamilton, Alexander Haigh, Webb Kammerer.

Precision Grinding Wheel Co., Philadelphia. Booth 311.
In attendance: L. C. Griffin, sales engineer; B. J. Lyons, Cleveland district manager; Charles Drake.

Productive Equipment Corporation, Chicago. Booth 557.

R

N. Ransohoff, Inc., Carthage, Cincinnati. Booths 458, 459.
In attendance: N. Ransohoff, president; D. M. Powers, H. E. Epley, J. H. Hopp, J. S. Miller.

Reading Chain & Block Corporation, Reading, Pa. Booth 551.
In attendance: George R. Harrison and F. H. Howard.

Reeder Mfg. Co., 6229 Delmar Boulevard, St. Louis. Booth 435.
In attendance: C. H. Reeder and C. L. Harrell.

Robbins & Myers Sales, Inc., hoist and crane division, Springfield, Ohio. Booth 500.
In attendance: F. F. Seaman, general manager, hoist division; J. R. Mears, sales manager, hoist division; C. E. Schirmer, chief engineer, hoist division; Albert Kreh, William J. Scott, J. J. Becker, E. S. Ludlow.

Robeson Process Co., also American Gum Products Co., New York. Booth 91.
In attendance: Gordon I. Lindsay, president; B. W. Bullen, secretary; T. J. Ryan, J. A. Smith, T. J. O'Hara.

Rogers, Brown & Crocker Brothers, Inc., Cincinnati. Booths 86, 88, 90.
In attendance: Geo. A. Crocker, C. H. Newcomb, F. W. Miller, George R. Sullivan, L. H. Miller, Edwin Raum, F. W. Bauer, Harwood Wilson, T. A. Wilson, S. B. Morrison, C. A. Reed, G. B. McLaughlin, J. C. Mears, C. P. Hellwig, J. C. McCrory, A. J. Wentworth, W. J. Loughery, J. R. Morehead.

Rotor Air Tool Co., 5704 Carnegie Avenue, Cleveland. Booths 405, 406.
In attendance: H. P. Bailey, K. L. Pohlman, W. G. Baily, R. H. King, F. B. Engeln, C. B. Scott, J. G. Cooper, A. L. Brunn, Jr., and J. R. Clague.

Royer Foundry & Machine Co., Wilkes-Barre, Pa. Booths 360 to 363.
In attendance: G. F. Royer, John Lloyd, S. B. Davies, Alexander Haigh, William Fenton and Stuart Lloyd.

John Royle & Sons, Paterson, N. J. Booth 526.
In attendance: Vernon E. Royle, vice-president; William Holt.

Ruemelin Mfg. Co., 598 Clinton Street, Milwaukee. Booth 235.
In attendance: R. Ruemelin, president; F. Reinhold.

S

Safety Clothing Co., Cleveland. Booth 79.
In attendance: Allen Clark, B. K. Clark, R. S. Douglas, C. R. Weller and E. W. Pierson.

Safety Equipment Service Co., Cleveland. Booth 99.
In attendance: Buell W. Nutt, Harry Lea and F. C. Blake.

Safety First Shoe Co., Framingham, Mass. Booth 102.
In attendance: Edgar C. Davidson and J. P. Henry.

Safety Grinding Wheel & Machine Co., Springfield, Ohio. Booths 364, 365 and 366.
In attendance: Charles W. Gwyn, president and general manager; H. G. Weinland, secretary and mechanical engineer; H. G. Bennett, W. H. Vance, D. R. Stewart.

Sand Products Corporation, Detroit. Booth 20.
In attendance: A. N. Farmer, treasurer; W. I. Saltee, sales promotion manager; M. P. Drennan, assistant general manager; C. N. Spidell, N. P. Dessert, George Crivel, William M. Maybank, G. H. Conley, William Maycode, C. F. Nugent, George Johnson.

Austin C. Saylor Associates, Inc., Cleveland. Booth 443.
In attendance: Austin C. Saylor, president; Agnes L. Saylor, secretary.

Semet-Solvay Co., New York. Booth 77.
In attendance: James M. Woods, general sales manager; E. K. Kyle, Samuel Weiss, A. E. Scherm, Gerald Nash, E. J. Rowe, Alfred Fischer, Charles P. Ryan, A. P. McClure, R. H. Watson, John Daker, W. S. Shelow.

Shepard Niles Crane & Hoist Corporation, Montour Falls, N. Y. Booths 382-385.
In attendance: F. A. Hatch, president and general manager; S. Buckley, first vice-president; R. T. Turner, vice-president and sales manager; F. E. Meeks, W. B. Briggs, G. G. Robbins, H. A. Baugh, J. D. Gillette, L. Kunzmann, E. H. Merrick.

W. W. Sly Mfg. Co., Cleveland, Ohio. Booths 340-351.
In attendance: S. C. Vessy, president; F. A. Ebeling, sales manager; G. A. Boesger, chief engineer; D. L. Harris, H. W. Gaeckle, C. P. Guion, E. M. LaMotte, M. T. Mortensen, C. F. Dunasky, R. G. Abbey, W. L. Kammerer, R. W. Hasselle, J. L. McVoy, B. C. Rochester.

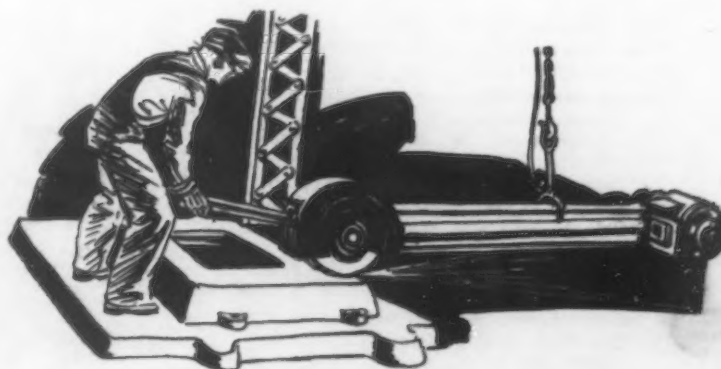
Eugene W. Smith, Inc., Evansville, Ind. Booth 25.
In attendance: Eugene W. Smith, Sr., Eugene W. Smith, Jr., and Joseph H. Warner.

Smith Facing & Supply Co., 1857 Carter Road, Cleveland. Booth 31.
In attendance: George W. Fleig, president; F. Ray Fleig, vice-president; J. S. Smith, secretary.

Smith-Monroe Co., South Bend, Ind. Booth 540.
In attendance: R. O. Monroe, secretary and treasurer.

Smith Oil & Refining Co., Rockford, Ill. Booth 103.
In attendance: O. S. Smith, S. K. Smith, F. C. Maley, J. B. Perkins, J. J. Maley.

Werner G. Smith Co., Cleveland. Booths 40 and 65.
In attendance: Werner G. Smith, L. P. Robinson, O. E. Steep, George H. Graham, M. M. Werckman, Milton S. Finley, Ray Hunter, N. A. Boyle, Frank H. Dodge, A. S. Coulter, John M. Glass, William E. Rayel, S. E. Sharer, Dr. Wallace Alexander, I. M. Gerteis and L. F. Ferster.



Spencer Turbine Co., Hartford, Conn. Booths 247 and 249.
In attendance: F. A. Wright, O. J. Dingee and R. A. Brackett.

Standard Conveyor Co., North St. Paul, Minn. Booth 234.
In attendance: P. C. Wego, E. E. Boberg and W. W. Zick.

Standard Safety Equipment Co., Chicago. Booth 441.
In attendance: L. E. Dickson and S. W. Montgomery.

Standard Silica Co., Chicago. Booth 6.
In attendance: A. C. Goodnow, president; R. W. McCandlish, vice-president, and L. D. Chadwick. Exhibit held jointly with Industrial Minerals Co., Columbus, Ohio.

Steelblast Abrasives Co., Cleveland. Booth 437.
In attendance: S. S. Parsons, C. M. Bolich, O. C. Sabin, E. L. Bessel and E. J. Carroll.

Sterling Wheelbarrow Co., Milwaukee. Booth 57.
In attendance: H. H. Baker, secretary; R. F. Jordon, assistant sales director; O. E. Steep, S. S. Cayne, J. M. Dickson, J. A. Patterson, G. H. Lambkin, H. F. Felsburg.

Frederic B. Stevens, Inc., Detroit. Booth 55.
In attendance: Frederic B. Stevens, W. J. Cluff, J. M. Mayers, J. F. Hughes, Jr., J. M. Johnston, T. H. Ledden, W. H. Dee, Dan Campbell, W. W. Bowring, G. H. Quinn, H. Laycock, C. J. Menzemer, J. L. Conboy, W. H. Dean, H. S. Taylor and J. G. Fox.

Stone Pattern Mount Co., Inc., Bloomfield, N. J. Booth 87.
In attendance: Charles W. Quast, manager.

Stoney Foundry Engineering & Equipment Co., Cleveland. Booths 293, 295.
In attendance: John T. Stoney, R. E. Stoney, E. S. Cohen, L. J. Reinhard and George A. Scott.

Sugar Pine Pattern Lumber Exhibit, San Francisco. Booths 409, 410.
A cooperative exhibit by Pickering Lumber Co., Standard, Cal.; Madera Sugar Pine Co., Madera, Cal.; Sugar Pine Lumber Co., Pinedale, Cal.; California Door Co., Diamond Springs, Cal.; McCloud River Lumber Co., McCloud, Cal.; Michigan-California Lumber Co., Camino, Cal.; Red River Lumber Co., Westwood, Cal.

Superior Sand Co., Cleveland. Booth 74.

T

Tabor Mfg. Co., Philadelphia. Booths 379, 380, 381.
In attendance: F. R. Wallace, vice-president; J. T. Ramsden, chief engineer; Leicester S. Lewis, secretary; Robert M. Maull, treasurer; P. J. Shire, J. Lee Allen, T. L. Sumner, William E. Sewell, H. W. Impey, J. Horace Coleman.

Warner R. Thompson Co., Detroit. Booth 45.
In attendance: Warner R. Thompson, president; Fred A. Cowen, vice-president; Charles L. Cruikshank, secretary; W. Edward Thompson, treasurer and sales manager.

Tiona Petroleum Co., Philadelphia. Booth 85.
In attendance: William H. Bassett, H. E. Washburn and E. H. Ward.

Tottenville Copper Co., Tottenville, N. Y. Booth 27.
In attendance: Leo Lowenstein, Arthur Lowenstein, Eugene Weingartner, Sam Siegel and Walter Taegen.

Truscon Steel Co., Pressed Steel Division, Cleveland. Booths 558, 559.
In attendance: H. E. White, vice-president and general manager; O. W. Loew, vice-president and director of sales promotion and advertising; J. Skove, assistant sales manager; N. C. Ferreri.

Tuscora Sand & Coal Co., Canton, Ohio, and Cleveland. Booth 21.
In attendance: C. D. Pinkerton, O. D. Clay and B. D. Fuller.

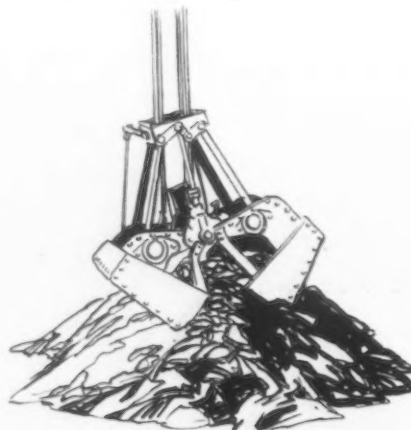
W. S. Tyler Co., Cleveland. Booths 407, 408.
In attendance: F. S. Curtis and N. E. Kile.

U

United Compound Co., Buffalo. Booth 97.
In attendance: William F. Bradley and Leslie F. Leney.

United States Electrical Tool Co., Cincinnati. Booths 451 to 457.
In attendance: H. O. Coe, Gordon Thornton, F. Franklin, L. E. Fries, John C. Goodman, T. H. Scaffie, R. N. Brayer, G. E. Smith, R. H. Clore, Col. J. A. Smith, J. C. Smith and Dewey Behlan.

United States Graphite Co., Saginaw, Mich. Booth 89.
In attendance: R. A. Corrigan, R. J. Edmiston, A. J. Heindel, R. M. Marble and O. R. Miller.



Universal Sand Equipment Co., Cleveland. Booths 219 to 222.
In attendance: S. L. Dryfoos, vice-president; E. P. Sawhill, chief engineer; M. A. Beltaire, C. M. Holcomb, E. J. Welter, W. C. Edgar.

V

Van Dorn Electric Tool Co., Townson, Md. Booths 535 to 543.
In attendance: R. W. Procter, E. W. Waechter, S. S. Waters, L. L. Charnickey, F. R. DuGuay and F. H. Zulaup.

Vesuvius Crucible Co., Swissvale, Pa. Booth 436.
In attendance: H. C. Sorenson, J. R. Covert, A. W. Protheroe and H. E. Roemhild.

W

Wadsworth Core Machine & Equipment Co., Akron, Ohio. Booth 429.
In attendance: George H. Wadsworth, president and general manager; M. C. Sammons, secretary.

J. D. Wallace & Co., Chicago. Booths 207, 208.

Jervis B. Webb Co., Detroit. Booths 460 to 463.
In attendance: Jervis B. Webb, president; Theodore Hegelman, sales manager; Hugh Boyd.

Westinghouse Traction Brake Co., Pittsburgh. Booths 370, 371, 372.
In attendance: F. C. Young, S. B. Schrentz, W. C. Burriss, J. F. Ames and S. A. King, Jr.

White Brothers Smelting Corporation, Philadelphia. Booth 8.
In attendance: Clarence B. White, president; Frank Krug, sales manager; Frank Ogden, Raymond Fritts, Raymond Hunter.

White Rock Silica Co., Chicago. Booth 26.
In attendance: Allen C. Wehenn, Robert Wehenn, Walter Gerlinger and Harry R. Donald.

Whitehead Brothers Co., New York. Booths 7 and 9.
In attendance: A. J. Miller, president; V. L. Whitehead, vice-president; J. H. Whitehead, secretary; C. E. Andrews, Eastern manager; R. L. Carpenter, F. B. Clark, A. G. Gregory, R. J. Hashagen, T. F. Hagan, A. J. Miller, Jr., A. J. McBride, E. H. Townson.

Whiting Corporation, Harvey, Ill. Booth, block K.
In attendance: T. S. Hammond, A. H. McDougall, M. J. Evans, R. S. Hammond, E. C. Rice, F. M. McGee, A. DeYoung, O. L. Coffey, H. Madsen, C. Fralick, H. W. Benton, A. J. Brown, J. Munro, W. Nagell, H. K. Christie, Steve Hammond, J. H. Gougler, W. DeVries, D. J. Reese, R. E. Prussing, L. D. Reed, G. M. Dennis, F. P. Walsh, W. R. Hans, Paul Hyland, H. E. Reynolds, S. R. Vanderbeck, G. G. Crewson, A. E. Smith, J. R. Bates, D. Polderman, Jr., M. F. Beetham, H. G. Mouat, D. S. Mair, S. Donaldson, M. Pendergast, C. A. Hardy, W. R. Bean, M. F. Becker, C. R. Taylor, J. Harrington and Colonel Mess.

Wilbraham-Green Division, of Connersville Blower Co., Pottstown, Pa. Booth 307.
In attendance: David Todd Jones, general manager; Norris C. Barriaro, sales manager; Henry R. Jones, superintendent.

G. H. Williams Co., Erie, Pa. Booth 36.

E. J. Woodison Co., Detroit. Booth 24.
In attendance: J. C. Woodison, vice-president; C. D. Yahne, treasurer; G. A. Burman, plant superintendent; H. J. Wark, R. S. Hoffman, M. E. Kohler, James A. Carey.

T. B. Wood's Sons' Co., Chambersburg, Pa. Booth 35.
In attendance: Charles M. Wood, assistant treasurer; Victor Leisher, foundry foreman; George W. Leisher, assistant foundry foreman; H. M. Stickel, engineer.

Wright Mfg. Co., Bridgeport, Conn. Booths 317, 319.
In attendance: H. F. Wright, R. F. Straw, J. B. R. Smith.

Y

Yale & Towne Mfg. Co., Stamford, Conn. Booths 209, 210.

Young Brothers Co., Detroit. Booth 225.
In attendance: R. B. Reed, sales manager; C. G. Lisch, assistant sales manager; V. A. Fox, chief engineer; T. P. McVicker, C. W. Mullenhagen and William Mayor.

Z

Zanesville Sand Co., Zanesville, Ohio. Booth 58.
In attendance: F. G. Flegal and Harry M. Flegal.

Metallurgical Trends in the Gray Iron Foundry

ONE of the most important demands in the foundry today is for an improvement in the quality of the metal and particularly for an improvement in the quality of gray iron. Abroad "perlitic" iron has been receiving a great deal of attention but its production necessitates the use of dry sand molds, the pouring of the metal into hot molds and other features which do not lend themselves readily to the quantity production of high-grade castings made in the usual way.

Closer Attention to Melting and to Alloys

IN this country foundrymen have been striving to develop simpler methods of arriving at the same goal. Practically every foundryman is giving closer attention to melting and, in the case of thin sections, is studying the sand condition closely to avoid the chilling of the metal during pouring. There is also an increased tendency to use special metals or alloys containing nickel, chromium or other elements to give the metal certain desired properties.

All progressive metallurgists are agreed that hot melting solves many problems in the way of cleaner metal and better composition. For this reason cupola practice tends toward careful attention to details and a higher melting temperature. In this connection several very interesting cases have come under the writer's attention recently.

One plant is melting a mixture consisting of the return sprue and scrap from previous heats together with a straight steel mix, no pig iron being added. However, they add ferrosilicon and ferromanganese in the spout. The metal then flows into a large receiving ladle and from this it is poured into smaller ladles for distribution. Most of the castings made are of fairly good size and must have exceedingly high strength.

A number of foundries, which formerly made four or more mixes of iron per day, are now melting not to exceed two, and are correcting for special castings by additions in the ladle.

One manufacturer of special machinery requires close grain, strong iron and has long been making a cupola mixture with 30 per cent steel. This metal has a tensile strength of approximately 40,000 lb. per sq. in., which puts it in the class with perlitic iron. The trouble they have had with this metal, however, is that, in cases where the cast-



H. M. LANE
President
H. M. Lane Co.,
Detroit

Electric Furnace to Be Used More in Melting Gray Iron

Uniformity in Cupola Practice, Never Before Attained, Now Near at Hand

Hot Melting Solves Many Gray Iron Problems

Increasing Tendency to Use Alloys to Obtain Special Properties

Dry Blast in the Cupola of the Future

More New Plants for This Year—Demand Small Now



ings must be polished and be absolutely free from pin holes, there has been considerable loss due to very small blow holes or gas holes.

They have now installed an electric furnace of the horizontal arc type and are making a metal from 100 per cent scrap, 50 per cent of the charge is borings and the rest other scrap, with possibly 5 per cent of steel in the mixture. The tensile strength of this mixture is approximately 40,000 lb. per sq. in., and its hardness the same as the cupola mixture. But it machines very much easier, due to the fact that, by melting at a high temperature in the

electric furnace, the carbon is broken down into such a fine state that on cooling it will not recombine into large flakes or plates and hence gives a much stronger metal.

The interesting feature, however, is that the castings are absolutely free from the pin holes occurring in the cupola mixture and difficult castings which must be polished come absolutely sound.

Dry Blast in Cupola in the Future

CUPOLA practice of the future will undoubtedly tend more and more toward the use of some method of drying the blast to free it from moisture and some method of heating the blast to improve melting conditions. For short heats it is probable that no attempt will be made to use the waste gases from the stack for heating the blast. In fact, in most of the installations now in use one is essentially running the cupola as a gas producer to get gases to heat the blast. By taking precautions in the cupola to prevent the formation of carbon monoxide and then heating the blast from a separate source of heat, foundrymen of the future will undoubtedly attain uniformity in practice never achieved up to this time.

Where current conditions make it possible, or where current conditions and a low scrap cost are in proper agreement, the electric furnace melting of gray iron is bound to come into service to a far greater extent in the production of high-grade gray iron castings. Duplexing of the electric furnace will also increase in many fields.

Important Structures Welded

Fourteen-Story Buildings Planned—Numbers of Tanker-Barges Constructed—Code for Super-Power Boiler Drums Considered

BY E. E. THUM*



American Welding Society held its annual meeting in New York April 23 to 25, a number of technical papers, committee reports and accounts of investigations occupying six well-attended sessions. Principal topics were the welding of structural steel into buildings and boats, service piping for buildings, and the manufacture of high pressure boilers. As an under-

tone to all the discussion was the subject of training welders to make a reliable joint.

Officers elected for 1930 are for president: E. A. Doyle of Linde Air Products Co.; for senior vice-president: F. P. McKibben, consulting engineer; for divisional vice-presidents: C. W. Babcock, W. W. Barnes and H. A. Woofter.

Drums for Power Boilers

IT is well known that the boiler code committee of the American Society of Mechanical Engineers has promulgated rules for the construction of unfired pressure vessels by fusion welding. These rules can hardly be called satisfactory to either the mechanical or the welding engineer, since the size was limited to 20 in. diameter, plate thickness to 3/16 in., the air pressure to 100 lb., and the stress at the joint to 5600 lb. per sq. in., thus sharply restricting the number of uses and preventing expected economies in construction. A few months ago, a proposed revision of these rules was published and discussion invited. Now comes the boiler code committee, and with the help of representatives of the American Welding Society, proposes "specifications for fusion welding of drums or shells of power boilers."

Drums requiring plates up to 2 in. thick can be riveted quite satisfactorily, but the steam pressures of 900 to 1500 lb. found economical for large central station power plants require large drums with walls of 3 in. or more. Heretofore such equipment in moderate diameter has been hollow forged from an ingot, and it was the opinion of the meeting (which was attended by many representatives of boiler makers, users, inspection and insurance companies, and designing engineers) that the fusion welded drum has a better chance to compete with the hollow forged drum with very thick walls and larger diameters, than it has to compete with conventional boilers made of plate 1 in. thick or less.

Having in mind that a number of high-pressure drums and stills have been made, both by automatic arc welding and by manual oxy-acetylene welding, and used success-

fully by petroleum refineries and chemical plants, the "proposed specifications" use 11 of the 15 paragraphs to describe the tests which must be made by the man or on the machine doing the work to prove competency, and the proof tests on the completed drum. Other paragraphs specify the kind of steel to be used, the method of relieving locked-up stresses along the joint, location of outlets and allowable working stress.

Welded specimen tested in tension must break in the plate, or, if in the weld or at the edge of the joint, at a unit stress equal to the minimum specified tensile strength of the plate used. When this requirement, and others for bending, impact, fatigue, chemical composition, and structure are passed, the joint shall be assumed to have an efficiency of 80 per cent, and the drum shall then be designed for a factor of safety of five.

Discussion through a long session mainly concerned the adequacy or propriety of the various tests specified. A pronounced difference of opinion could apparently be developed about each detail—a matter of regret if it indicates that the welders themselves are not sure of themselves. In this event the members of the boiler code committee can justify their oft-repeated statements that they have not yet been able to authorize welded construction on pressure vessels, because they have never yet been given proof that it will be adequate and safe. Thoughts on the multiplicity of tests are developed further on the editorial pages of this issue of *THE IRON AGE*.

Welded Structures

AS remarked at the outset, several important investigations on welded structural joints were reported to the meeting. E. H. Uhler and C. D. Jensen, of the civil engineering department of Lehigh University, built a number of frames consisting of two columns and a beam connected to them by one of several welded joints. They found that the elastic deflection of the members under working load put high stresses into the welds.

Another series of tests by C. H. Jennings and A. A. Jakkula, research department Westinghouse Electric & Mfg. Co., indicated that considerable flexibility is desirable in beam-to-column connections in order to produce joints which are safe under both static and dynamic loads. L. C. Bibber, U. S. Navy Bureau of Construction and Repair, prepared an extended analysis of the "Theory of Stresses in Welds," in which a considerable number of eccentric joints, such as single lap fillet welds, were analyzed according to the theory of elasticity. Equations and curves were derived from which the most economical shape of weld and the maximum efficiency of the joint can be predicted.

The most important investigation into strength of joints is being undertaken by the society's own structural steel welding committee. This committee set out two years ago to determine safe design stresses for fillet and other

*Associate editor *THE IRON AGE*.

welds ordinarily used in structural joints. Under the vigorous direction of the chairman, J. H. Edwards, chief engineer, American Bridge Co., the procedure was established, steel secured, joints made and tested, and enough of the results collated to indicate that the original goal is almost reached.

For this work \$10,000 was donated by the American Institute of Steel Construction, \$5,000 by the International Acetylene Association, and \$7,500 by the National Electrical Manufacturers Association, and about one-third of the total has been expended so far. The joints were made by 33 qualified welders in 32 scattered structural fabricating shops. In those series of tests which have been finished and results plotted, the figures for ultimate strength of the welds are in close agreement—in agreement so close that an open-minded critic would have to admit that the “personal element” of the workman had been eliminated by proper procedure control. Mr. Edwards reported that of the 37 welders tested, 33 qualified. Three of the failures were in one shop.

Many Large Buildings Completed

From the casual way in which large projects were announced and received by the audience, it is apparent that welding of structures is a rapidly expanding practice. Several aspects of the problem were discussed. Russell Whitehead, editor of *Pencil Points*, in speaking to the subject “What the Architect Wants to Know About Welding,” said that the architect, contrary to the common impression, is not primarily an artist but a business man. If he is an artist, he has a business man in his organization, and these business men are much interested in constructional details. When studying any new product or process the principal question asked by them would be: What is the experience of others with it? What is its cost? How can I specify it? Where are the organizations which can do it?

F. P. McKibben, consulting engineer, answered some of these questions by stating that the first welded building was constructed in 1916 and there now exist about 100 structures, either wholly or in good part welded, ranging from one to 11 stories high. Among new projects is a 3000-ton skeleton for a 14-story office

building in Los Angeles, and a 1600-ton 15-story building in Boston, both of which will be shop riveted and field welded. Mr. McKibben said that several reputable engineers are available to design such structures and supervise their construction; four of the largest fabricators are equipped for the work and will bid on the three alternatives (a) all riveted (b) shop riveted and field welded (c) all welded. Some 80 cities have revised their building codes to permit welded construction, and large cities have issued special permits to reputable builders.

Minimum Costs Not Yet Approached

No fabricating shop has yet had a sufficient volume of the work to permit continuous operation of a welding crew, consequently the real costs of welded construction are as yet problematical, in the opinion of F. T. Llewellyn, United States Steel Corporation, New York. Even so, trusses when properly designed for welding can be made cheaper than riveted work, because 20 to 25 per cent of the weight is saved by eliminating gusset plates and clip angles. At present, however, there seems to be no advantage in welding tier buildings with conventional beams and columns. The extra cost of welding about counterbalances the savings in steel permissible by fixing the beam ends.

Greatest Savings Are in “Fussy” Work

Characteristics of the two methods of joining are so different, in the opinion of G. H. Danforth, contracting engineer, Jones & Laughlin Steel Corporation, Pittsburgh, that new viewpoint and design are essential. He cited two designs for similar structures, one of which had merely substituted welding for riveting in standardized connections. It required 14.5 ft. of fillet weld per ton of steel, whereas the equally strong design made intelligently to utilize the new method required 7.4 ft. of welding per ton. Jones & Laughlin is completing a high welded structure, equivalent to a 14-story building, which is within $\frac{1}{8}$ in. of true plumb, a limit seldom approached by riveted frames. In his experience the greatest savings are effected in “fussy” work, and for making additions to existing steel work, which has sometimes moved from its theoretical position 2 or 3 in. in line or elevation.

STRUCTURAL Welding Is Especially Economical for Truss Work Where Much Weight Can Be Saved By Eliminating Gusset Plates. View shows assembly floor of Black, Sivalls & Bryson, Inc., Bartlesville, Okla.



Machine Tool Makers Discuss Costs

Two Days' Sessions at Cleveland Stress Importance of Accounting, Particularly in Marketing

WITH the object of securing adoption eventually of a uniform system of accounting in the machine tool industry, cost methods were discussed by machine tool builders and their accountants at a two-day conference held by the National Machine Tool Builders' Association at the Hotel Cleveland, Cleveland, April 22 and 23. Marketing expense was one of the subjects considered at considerable length. One session was devoted to foundry costs. There was a registered attendance of 115, including plant executives and heads of their accounting departments.

Uniform cost methods have been considered at 19 regional meetings of the association. The purpose of the Cleveland meeting was to review the entire subject, supply information that would be of value to the members in handling their cost systems, clear up disputed points, secure the reaction of members to various proposals and crystallize sentiment on the subject of a uniform cost system.

E. F. DuBrul, general manager of the association, presided at the opening session and pointed out what specific information a plant executive should be supplied with through the use of an adequate cost system. The association, he explained, is working out a set of principles and simple methods of figuring costs, one of the most important objects of which is to place the burden where it belongs. During a later session a plan was presented for the distribution of burden.

Technical details of a proposed uniform cost system were explained by Albert E. Grover, cost accountant of the association, following Mr. DuBrul's presentation of the subject. Mr. Grover presided during the remainder of the meeting, leading in the discussion, in which Mr. DuBrul also took an important part. Mr. Grover outlined various details of a cost system.

Four Major Divisions for Cost Allocation

A chart was used to illustrate the general plan. On this were listed as the four major activities of a plant: engineering, machining, assembling and crating and shipping. The various cost items such as material, labor, burden, administration, defective work, repair parts, marketing, depreciation, interest, etc., were tied up in the general scheme as illustrated on the chart.

A standard form of shop order covering material, labor and burden was

How Job Cards May Be Used to Maximum Advantage Was One of the By-products of the Cost Conference.

* * *

That Further Time Studies of Operations Are Essential Was Another.

* * *

Distribution of Marketing Expenses Proved to Be Difficult of Solution for All Cases.

shown and the members favored designating this as a manufacturing order.

Mr. Grover called attention to the fact that many shops do various special work and he doubted whether the burden was properly collected and distributed on this class of work. In discussing labor control in connection with cost systems he stressed the importance of having time studies so that a comparison of standard costs with actual costs can be made. He favored comparing standard time every day with the actual time spent on the job instead of waiting a week or two before making the comparison.

Regards Job Card Important

The job card, he said, should be made in the office and delivered to the department foreman and put in his card file one or two days in advance of the operation. He thought the time is coming when less attention will be paid to the in and out clock and more to the job time card in the department. When a man rings in on the time clock he may be quite a distance from his department, but when he punches the job card he is near where he works.

The speaker exhibited a time card rack designed by cost accountants of the association for holding production orders that follow the work through the shop. Each rack has five tiers of time card compartments and one of the advantages of a rack of this design is that it is made in sectional form so that as many racks can be supplied as the department requires.

Members approved the adoption of standard costs based on time studies and the association will conduct further investigations along that line.

The distribution of marketing costs

in a cost system was discussed at considerable length. Mr. Grover declared that administrative expense must be analyzed and a proper share applied to marketing. Marketing expense might be very high and sales very light during one month, he said. These costs are likely to be high when business is poor. He asked if it is not a good principle to figure out a normal selling expense over a period of years.

Suggest Averaging Marketing Costs Over Three Years

Mr. DuBrul pointed out that a machine tool manufacturer can put in a lot of deferred market effort and to mark off marketing costs against sales for a certain period might result in high marketing cost. The machine tool industry, he said, runs pretty definitely on a three-year cycle, there having been only two exceptions to that over a long period of years. He suggested that market expense be averaged over a period of three or four years instead of charging all incurred during one month against sales for that month.

In that way sales expense would be set up as a deferred charge and if the expense is abnormal for one month because of the issue of a catalog or other publicity matter, this expense would be spread over an extended period. It was contended that it is just as important an aid to management to establish a normal selling expense as it is to establish a normal manufacturing expense. However, objection to the establishment of an average selling expense was voiced by some of the members.

Commissions paid to machine tool dealers are marketing expense, said Mr. DuBrul. Machines should be invoiced at the user's cost and the dealer's commissions deducted as part of the selling expense. Otherwise a manufacturer could not tell what it cost to market his goods.

A method to establish normal burden rates for departments and machines was offered in a new bulletin accompanied by various schedules that included rates worked out for individual machines. Mr. Grover said that burden distribution is the cream of cost accounting and urged the importance of having a uniform system that would permit the making of comparisons later. Two things to be accomplished by the adoption of the plan are the proper distribution of costs and making it possible to compare these costs with standard cost.

Builds Large Double Plate Trimmer

*Machine for Welded Steel
Pipe Production Line
Trims Both Sides of $\frac{1}{2}$ -in.
Plates, 50ft. Long, in One
Pass of the Tools*

STEEL plates $\frac{1}{4}$ to $\frac{1}{2}$ in. thick, 50 ft. long and from 31 to 55 in. wide in the rough are trimmed on the double plate trimming machine illustrated, which has been completed recently by William Sellers & Co., Inc., Philadelphia, for the Republic Steel Corporation, Youngstown, Ohio.

This machine will be employed on the plates used in making 8 to 16-in. diameter welded steel pipe for gas and oil lines. The manufacturing process is of straight-line production type and the trimming machine, in receiving the plates directly from the rolling mill and preparing them for subsequent operations, plays an important part. The untrimmed plate is delivered by a roller table to one end of the trimmer, drawn into the machine, trimmed and then ejected at the opposite end, ready for rolling and other subsequent operations.

One cutting stroke and one return stroke constitute a complete operating cycle, in which both sides of the steel plate are trimmed parallel. Operation differs from the usual planing process in that strips are trimmed off both sides of the plate simultaneously and at one pass, reducing the plate to the

proper width irrespective of its original or rough width.

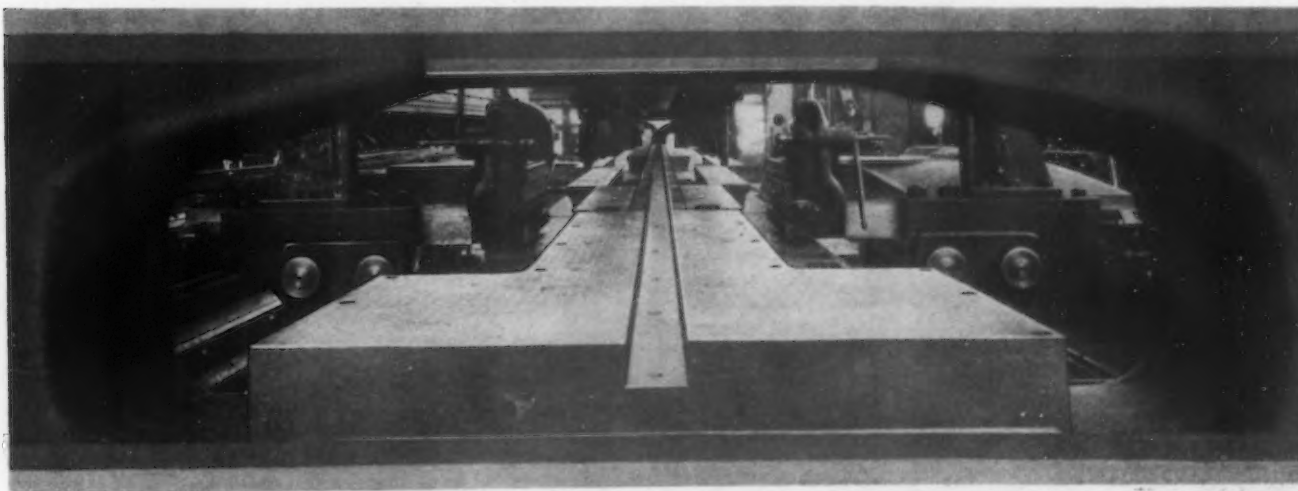
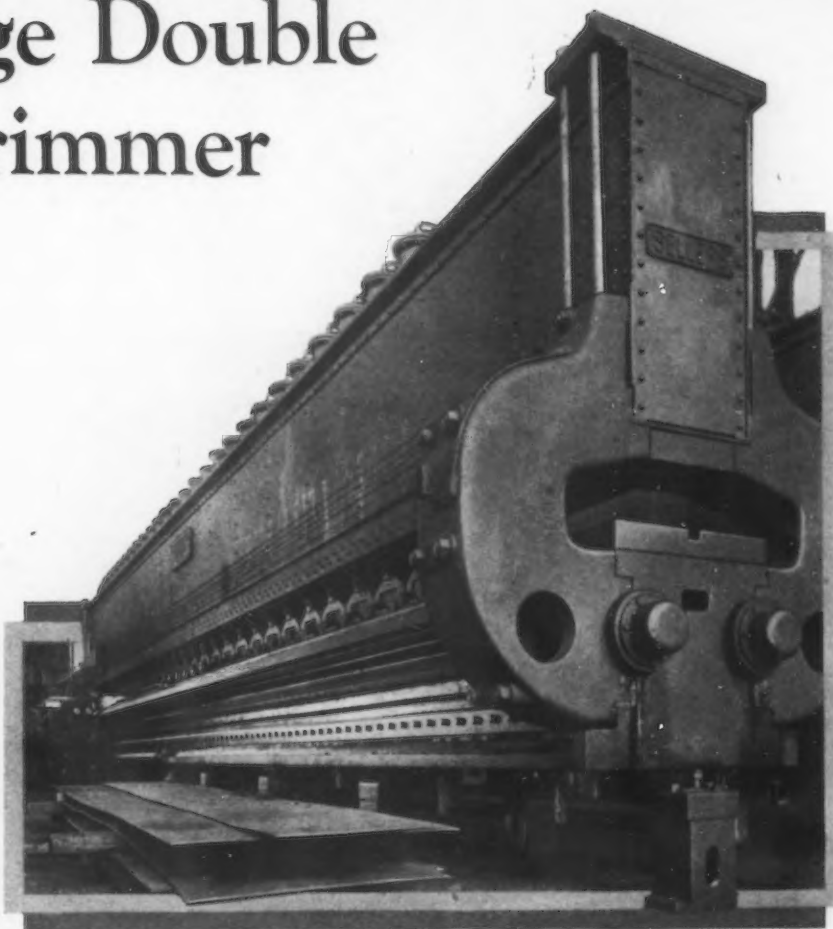
Cutting speeds range from 30 to 75 ft. per min. and return speeds from 30 to 90 ft. per min. A 250-hp. 3-to-1 reversing motor is employed for the drive.

Component members include the long cast-iron bed; deep steel girder that carries the clamping mechanism; and two screw-operated saddles, one on each side of the bed. The saddles are equipped with a tool-slide and push-button control, and incorporate grippers for drawing the plates into the machine and stops for ejecting the trimmed plate. The machine is 74

ft. 4 in. long and 13 ft. 2 in. high. It weighs 315,000 lb.

Bed Made in Two 32½-Ft. Sections

The bed is in two sections, each 32½ ft. long, bolted together. The top surface is covered with renewable, hardened and ground steel plates on which rest long adjustable blocks. These blocks, held by bolts in T-slots, can be adjusted to and from the center of the bed in order that plates of various widths can be supported close to the point of cut. To reduce the sliding friction when the plates are drawn into position, these blocks are equipped with a series of steel balls,



Bed of Double Plate-Trimmer as Seen From End of the Machine. On the top surface rest long blocks that may be adjusted to and from the center of the bed so that plates of various widths can be supported close to the point of cut

52 in all, extending slightly above the surface. They are supported by springs so that when the clamping pressure is exerted on the plates from above, the balls are depressed.

The steel girder above the table carries 50 air-operated jacks for clamping the plates in position. It is 65 ft. long, 6 ft. deep and 30 in. wide, and is supported by castings at the ends of the bed. The jacks, arranged in two rows, are actuated, through

are depressed by the weight of the plate when being drawn in.

Each Slide Carries 32 Tools

On each side of the bed is a saddle driven by a large screw and carried on ways (one above and one below the screw) which are lined with hardened and ground steel wear plates. The saddles are equipped with adjustable tool-slides to accommodate various widths of plate. Each slide is

tool-slide that they can span the edge of a plate for a distance of $3\frac{1}{2}$ in. This is necessary so that the tools can trim out, at one pass, the irregularities encountered in plates received directly from the rolling mill. The tool manifolds are also provided with guides to center the plate equally between the upper and lower tools. These guides extend the full length of the manifolds and have their forward edges tapered. This arrangement is stressed as of particular importance when slight bends are encountered in a plate.

Plate Grippers and Their Action

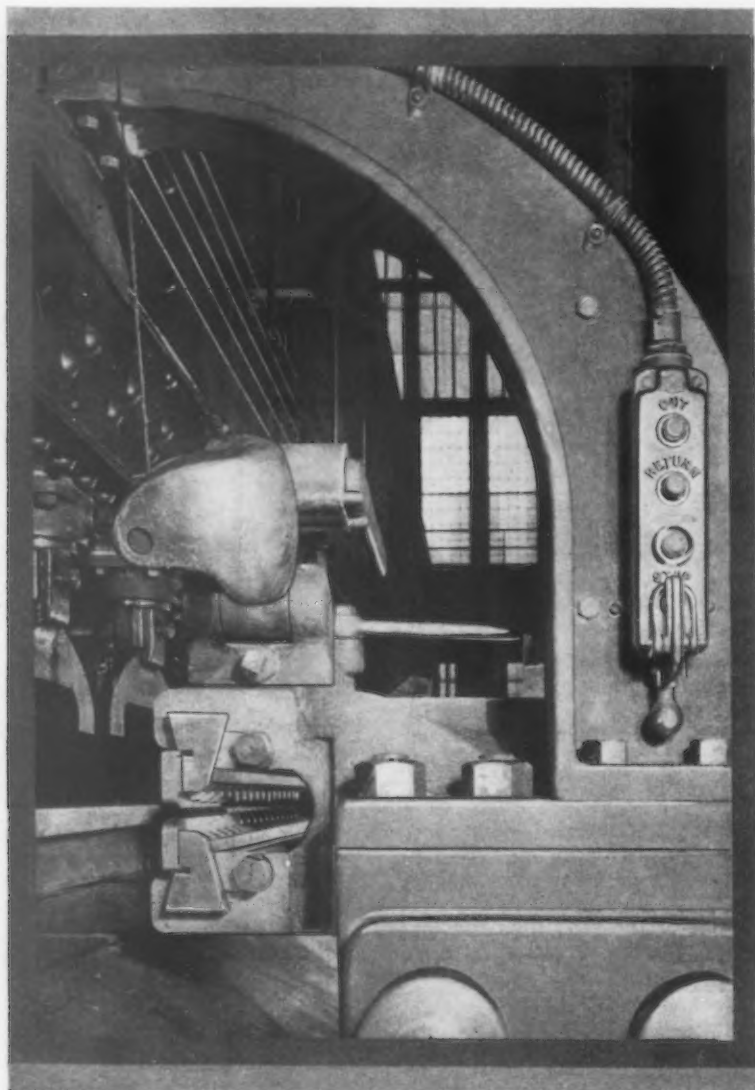
When the untrimmed plate is delivered to the "receiving" end of the machine, the saddles are run up and the grippers on each tool-slide set on the plate. Then, by reversing the saddles the rough plate is pulled into position. These grippers consist of two serrated steel jaws, the lower one fixed and the upper one actuated by lever and cam. When in the released or open position, there is sufficient clearance between the jaws to permit free passage of the plate on the cutting stroke. The grippers may be swung up and out of the way to permit removal of the tool manifolds.

Finished plates are ejected by push-off stops. Like the grippers, these stops are carried on the slide, but are behind the cutting tools. They are hinged and can be quickly swung clear or into position by the operator. When set they are directly behind the upper and lower tool manifolds and will thus engage the corners of the trimmed plate. Hence, on the return stroke of the saddle, the push-off stops eject the trimmed plate while at the same time a new plate is being drawn in by the grippers on the other side of the slide.

Convenient Disposal of Trimmings and Chips

The irregular strips trimmed from each side of the finished plates are removed by means of 12 push-off cylinders located between the adjustable blocks that support the plates. The cylinders are actuated by a convenient valve and push the strips off the side of the bed. The strips and the chips made during the cut slide down inclined sheet metal plates and drop clear of the screws and ways. The saddle is cored out so that chips, instead of piling up under the tool-slide, will pass through to the floor. Scrap thus accumulated on the floor is carried by a belt conveyor (entirely separate from the machine) to chopping machines which cut the strips into short pieces and discharge them into buckets for transfer to the scrap pile.

A 250-hp. Westinghouse d. c. 3-to-1 reversing motor, equipped with Cutler Hammer control, is employed for the drive. Push-button stations are located on each saddle beside the operator's platform. Connection with the panel is through a series of trolley wires protected by a sheet metal guard. The motor drives through a flexible coupling to a set of herring-



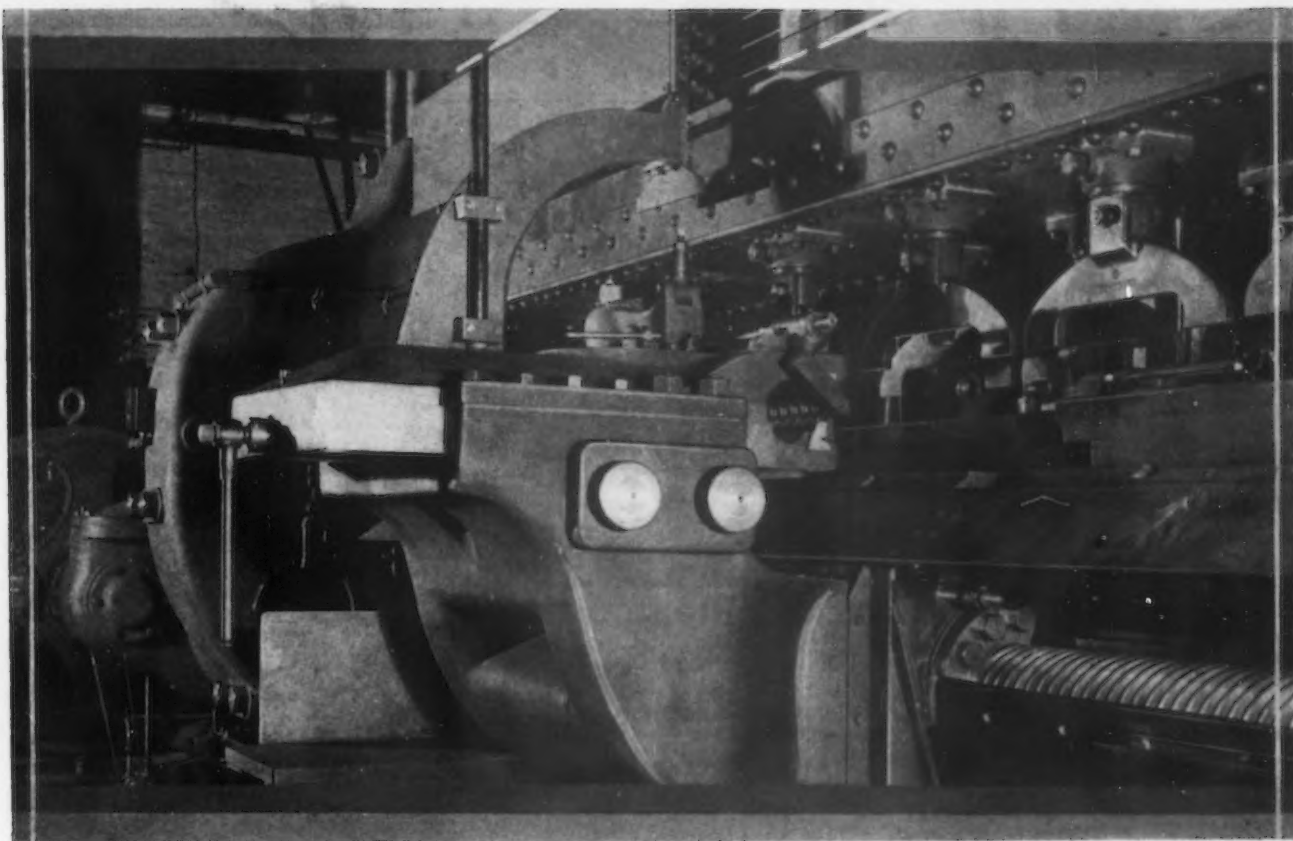
THE Slide On Each Saddle Carries 32 Tools, 16 in a Manifold Above the Plate and 16 in a Manifold Below. Grippers on each tool-slide facilitate pulling the plate into the machine

connecting rods, by air cylinders located at the top of the girder. Each exerts a pressure of 5000 lb., giving a total of 250,000 lb. on the plate. This pressure can be relieved and the clamps raised in seven seconds. A rod that extends the entire length of the machine and is equipped with conveniently placed handles controls eight three-way air valves which supply the cylinders. Each jack has a two-point adjustable clamp which can be revolved to exert its pressure on either narrow or wide plates. To further resist the cutting pressure, the plate is set so as to abut against two spring kick-up stops located near the loading end of the machine. These

are arranged for 32 tools, 16 being held in a manifold toolholder above the plate and 16 in a manifold below. These tools are in line so that a square trim is obtained. The leading tools take broad and shallow cuts while the succeeding tools take narrower and deeper cuts until the plate is trimmed through completely by the last two overlapping tools.

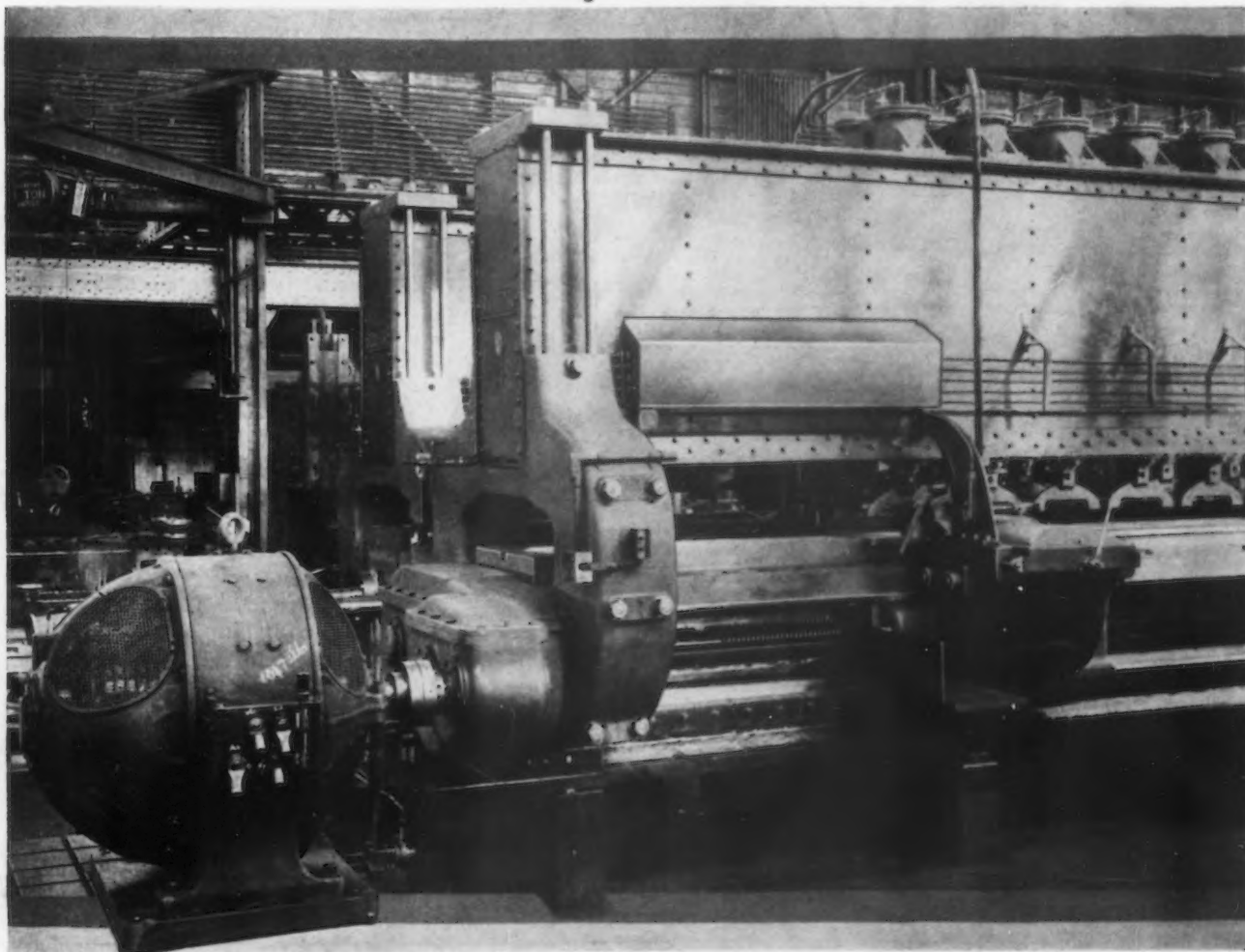
These tool manifolds can be quickly removed and another set inserted, this being accomplished by removing only one bolt on each manifold. Individual set-screws in the manifold are used to adjust each separate tool, this work being done in the tool room.

The manifolds are so held in the



(Above) The Saddle, Driven By a Large Screw, Is Carried on Ways, One Above and One Below the Screw. Push buttons beside the operator's platform permit convenient control

(Below) The Drive Is By 250-Hp. Reversing Motor Through Herringbone and Spur Gears. Connection with the control panel is through a series of trolley wires. Each of the 50 air-operated plate clamping jacks at the top of the girder exerts pressure of $2\frac{1}{2}$ tons



bone reduction gears and a train of steel spur gears. These, in turn, drive in unison the large screws engaging the saddle nuts.

End Thrust of Screws Taken on Roller Bearings

The shafts in the gear train are mounted on S. K. F. ball bearings. The screws are supported throughout their length by bronze half bushings backed with cast iron bolted to the bed, and end thrust is taken by special Rollway roller thrust bearings. These screws measure 67½ ft. overall, with 59 ft. of thread. They are 6 15/16 in. in diameter with six threads and 7½-in. pitch. They engage 100-deg. bronze nut segments in the saddles and each nut, 36 in. in

length, is keyed and bolted to the saddle.

The gear train, screws and saddles are oiled by means of a rotary pump direct connected to the motor shaft. This pump draws oil from a large reservoir and forces it through brass piping to the various points. A Purolator in the supply line as well as strainers in the return lines and in the reservoir assure clean oil. Pipes that extend the full length and on each side of the bed supply a generous quantity of oil to the upper saddle ways, the oil then flowing down on to the screws. The half bushings supporting the screws form a trough for the oil; they have overflow pipes which carry the oil to the lower saddle ways. The oil then returns to the reservoir.

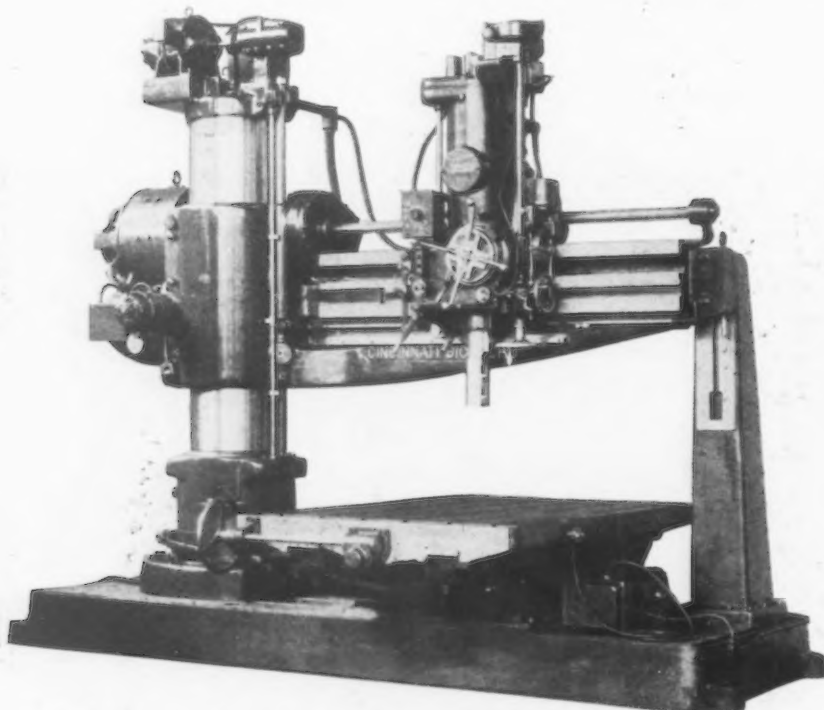
Large Radial Drill Adapted for Press Frames

TO facilitate the boring and drilling of printing press frames, as well as for use in general drilling operations, the Cincinnati Bickford Tool Co., Cincinnati, recently built the special 7-ft. Master radial drill here pictured.

The machine has a 22-in. diameter column and weighs approximately 48,-

along the arm at an exact right angle to the cross movement of the table on the base. The head also is fitted with a micrometer dial indicator to permit precise adjustments.

Thus equipped, the machine can be employed to advantage for accurately boring and drilling large fixtures and



IN Addition to the Outer Arm Support, This 7-Ft. Radial Has a Special Jig Boring Table With Power and Hand-Operated Cross-Travel Mechanism. These parts are arranged for convenient removal (to permit general-purpose drilling,) and for accurate remounting

000 lb. with the equipment shown. To provide maximum rigidity and accurate alinement, the outer end of the arm is secured to a substantial supporting column. The special jig-boring table mounted on the base of the machine is equipped with power and hand-operated cross traverse mechanism, and fitted with a micrometer dial indicator so that accurate final adjustments may be made. The head moves

die-blocks, or in machining parts for which it is impractical to make jigs.

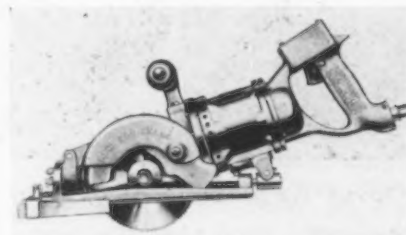
All operating controls are located at the head. Spindle speed changes are secured by means of two back-gear levers and a rheostat located on the head. A push button controls the clamping and the unclamping of the arm on the column and a lever under the head controls the vertical movement. The column is clamped by

means of a specially constructed torque motor, operated by push-button at the head. The head may be moved along the arm by power rapid traverse or by hand.

For general-purpose drilling operations, the outer arm support and special jig-boring table may be removed. They may be easily and accurately replaced, taper pins being provided for locating and realining them on the base.

Portable Electric Saw for Wood and Other Materials

A NEW portable electric saw, built in three sizes, with 6, 8 and 10-in. diameter saw blades, respectively, has been added to the line of the Van Dorn Electric Tool Co., Cleveland. The machine is for sawing of all kinds of wood and, equipped with an abrasive disk, it may be used on slate, marble, asbestos, transite, tile, porcelain, and similar materials.



Automatic Safety Switch and Telescoping Guard Are Regular Equipment

Equipped with a universal motor, the machine will operate on both a.c. and d.c. lines. It is equipped with an automatic safety switch and automatic telescoping guard. The safety switch starts the saw when the trigger is pulled, but cuts off the current the instant the trigger is released, while the telescoping guard opens automatically as the saw enters the work and closes over the blade when the cut is finished. Thumb screw adjustments are provided for regulating depth and width of cut and there is a graduated scale for bevel cuts, all adjustments being at the operator's finger-tips. The maximum depth of cut of 6-in. blade machine is 1¾ in., that of the 8-in. blade, 2½ in. and that of the 10-in. blade saw is 3½ in.

New Testing Laboratory to Be Dedicated

University of Illinois will celebrate the twenty-fifth anniversary of the foundation of the Engineering Experiment Station on Friday, May 2, by dedicating a newly constructed materials testing laboratory. On the following day will be held a conference on education in materials engineering. Visitors will be given an opportunity to inspect the various laboratories of the college of engineering as well as to become acquainted with the research investigations by the staff of the Engineering Experiment Station.

New Automatic Lathe

Feed and Rapid Traverse Actuated Hydraulically—Spindle Rotates Clockwise

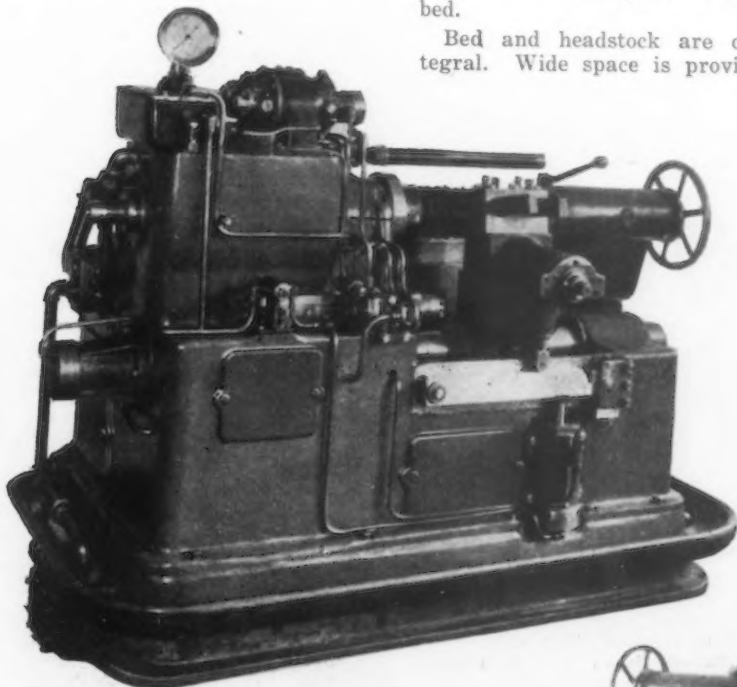
RAPID production and less than usual power consumption are claimed for the 16-in. automatic lathe recently brought out by the John S. Barnes Corporation, Rockford, Ill., a division of the W. F. & John Barnes

is claimed to have several advantages. The load on the rear tool-slide is downward directly against the lathe bed; the load on the front carriage, while upward is also directly against the lathe bed as the action is a pull on the front carriage bar in the lathe bed.

Bed and headstock are cast integral. Wide space is provided for

pivotal mounted on the lathe bed. A roller under the carriage runs on the guide bar. Accurate feeding to depth is assured because the guide bar is swung upward against a positive and adjustable stop.

The arrangement provides a universal front carriage which can be employed not only to feed the cutting tools into depth and turn straight but also to turn taper. Adjusting the stop up or down gives the taper desired inasmuch as the guide bar is inclined for tapers while horizontal for straight turning. The rear tool-slide is bolted to a large flat machined surface on the rear of the lathe and can be moved longitudinally along the bed to the position desired. The



Co. Hydraulic feed and control and simplicity of the driving mechanism are features.

The drive arrangement may be seen from the rear view illustration, which shows the machine with guards and covers removed to expose the drive chains and sprockets and the motor compartment. The chain drive to the main drive-shaft carrying a disk clutch, pick-off gears with herringbone gears for driving the spindle comprises the speed mechanism, there being only two gear contacts.

Power for rapid traverse of both the front and rear slides is provided by a pump which is chain driven from the motor. Power for feeding both the front and rear slides is obtained from pumps driven and controlled by the main spindle.

A single lever controls the rapid traverse, and the speed and feed mechanisms, are operated in response to the rapid traverse section.

Speed changes are made by changing the pick-off gears and feed changes simply by turning dials which are graduated to show the feeds in 0.001 in. per revolution of the main spindle. Feeds for the front and rear slides are set independently, a dial for each being provided.

Spindle rotation is clockwise, which is opposite to the usual practice but

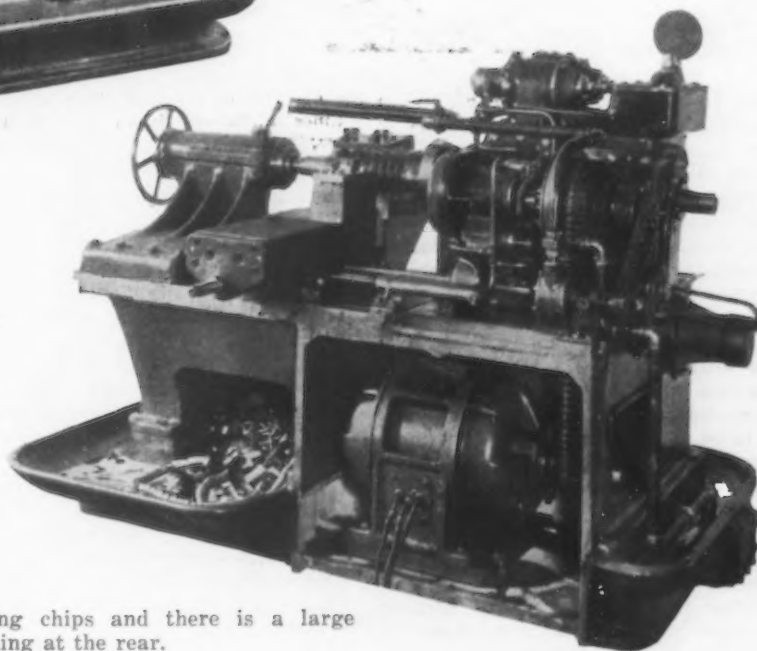
falling chips and there is a large opening at the rear.

Front Carriage Supported by 4½-In. Diameter Bar

The front carriage clamps to a 4½-in. diameter bar which is mounted horizontally on bearings in the lathe bed. It carries an adjustable cross-slide slotted for holding tool-blocks. Longitudinal feed to the carriage and bar is direct, the bar being fastened to the piston rod in a horizontal cylinder at the headstock end. In-and-out feed is also direct, the piston rod in a vertical cylinder on the front of the lathe bed being attached to a guide bar the other end of which is

AUTOMATIC Lathe with Hydraulic Feed and Control. One lever controls the rapid traverse, and the feed and speed mechanisms are operated in response to the rapid traverse action

Simplicity of the drive arrangement may be seen in the rear view of the machine, with guards and covers removed



tailstock is also bolted to the flat machine surface on the rear of the lathe. It has a ball-bearing center. A 5 to 15 hp. 1200-r.p.m. motor is required for driving the machine; overall dimensions are 44 x 74 in.

John B. Stevens, Inc., machine tool builder, will move from 27 Cleveland Place, New York, to 304 Hudson Street, on May 1. Company carries in stock parts for about 75 per cent of the lines formerly made by the Garvin Machine Co.

Machinery Controlled by Light

Photo-Electric Relay Also Used for Counting, Sorting and Controlling Artificial Illumination

CONTROL of the operation of industrial and other machinery through the interruption of a beam of light is made possible by the photo-electric relay recently brought out by the General Electric Co., Schenectady.

This relay, designated as the CR-7505-A-I, is essentially a vacuum tube device, and uses both the photo-electric tube and the pliotron. It func-

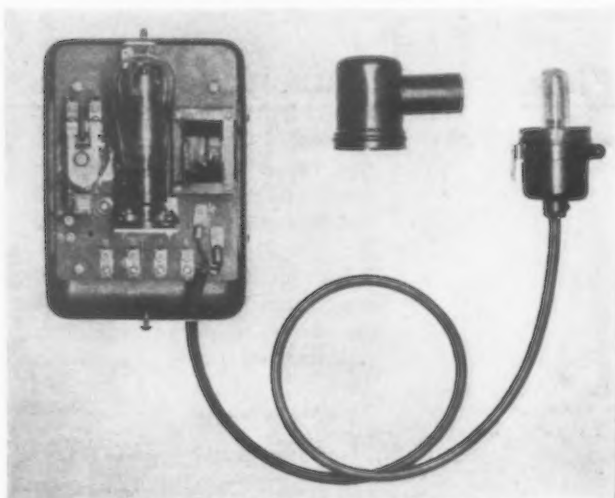
which actuates it, or without impairing the accuracy of delicate mechanisms.

Can be located remotely from the equipment controlled, thus permitting mounting in small spaces around automatic machinery.

Is adjustable in sensitivity.

Can be used outdoors by mounting in a watertight enclosing case.

Is easily installed, and its operation is easily adjusted or changed.



USING the Photo-Electric Tube and the Pliotron, This Relay Controls an Electric Circuit in Response to Increase or Decrease in the Amount of Light Falling On the Photo-Electric Tube. Applications include control of traverse mechanisms and counting and sorting packages

tions to control an electric circuit in response to an increase or decrease in the amount of light falling on the photo-electric tube.

One application is to mechanisms that travel in a given direction a certain distance and are then stopped or reversed. When such a mechanism reaches the predetermined limit of its travel it would interrupt a beam of light falling on the photo-electric tube and thus cause the control device to function. Another field is in counting bags and boxes of material produced in large quantities. As each bag or other item is passed through the essential beam of light it would cause the photo-electric relay to operate, and actuate a magnetic counter. Vehicles passing a definite point may be counted in like manner.

Other applications include sorting packages according to size, shape or reflecting power, stopping paper machines when the paper breaks, alining the paper on the rolls of the same machine, deflecting packages on conveyors, and operating bag piling mechanisms. An interesting use of the photo-electric relay is for controlling lights or illuminated signs according to the intensity of daylight. In office and factory buildings the new relay may serve to turn on the artificial lighting automatically when the daylight intensity falls below minimum.

The following advantages are claimed for the new relay:

Operates without shock or resistance to the progress or movement of the object

Can be operated at high speeds, 100 times a minute being an approximate maximum.

For some applications it may be necessary to select carefully a suitable light source and optical accessories, but for a large number of cases the light source may be a domestic Mazda lamp with or without a simple reflector and shield. Although the standard electric supply for the relay is 110-120 volts, 60 cycles, alternating current, the device can be built for other frequencies or voltages. A similar device is made for operation with direct current.

Operation of the relay is described technically as follows: With a voltage of proper polarity and magnitude applied between the two elements of the photo-electric tube, the current it passes is proportional to the amount of light shining upon it. This current, of the order of a few microamperes, is amplified by a pliotron. The sensitive relay is connected in the plate circuit and is energized or deenergized in accordance with the amount of light on the photo-electric tube. The contacts of the relay control the coil circuit of the contactor. When the relay in the plate circuit of the amplifier is energized, it will first open its normally-closed contacts and then close the normally-open contacts. This relay, therefore, either makes or breaks the coil circuits of the contactor depending on how it is connected.

When the contactor is deenergized approximately ten watts is required by

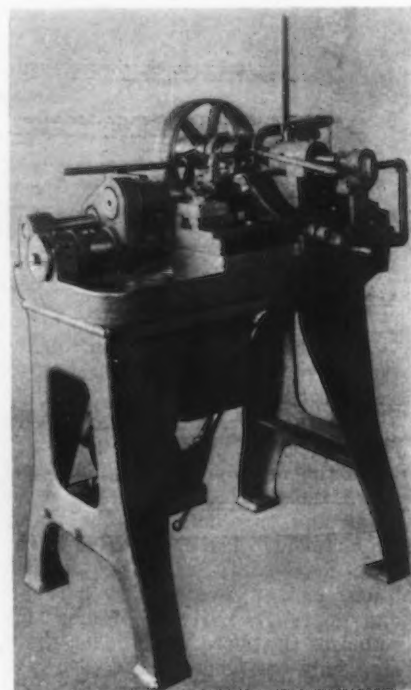
the device, and when the contactor is energized approximately 30 watts is required.

Thread Miller Machines Straight and Taper Taps

THE Wells Mfg. Co., Greenfield, Mass., is introducing a thread-milling machine designed to thread taps by means of a hob milling cutter at one revolution of the work. It will mill either straight or taper taps, with or without radial relief, up to 2-in. pipe size. No lead screws or nuts are used, the lead being produced by hardened and accurately ground cams, mounted directly on the work spindle.

All parts are accessible for the simple adjustments necessary. The tap blanks are driven by their squared ends, and no dogs or clamping device are required to drive work. In having the tail-center operated by the vertical lever on the head of the machine, a minimum of time is required to change the work. As each piece of work is completed the machine stops automatically.

The machine can be furnished either for individual 1/2-hp. motor drive, or



Using a Hob Milling Cutter, the Machine Threads Taps at One Revolution of the Work

for single-pulley drive direct from the lineshaft. Feed changes are obtained through inclosed gearing. All worm gearing is inclosed and runs in oil. A gear pump and a large oil reservoir with removable chip tray are standard equipment. Floor space occupied is 30 x 36 in. and the weight of the machine is 1200 lb.

Copperweld Steel Co., Glassport, Pa., has appointed American Electric Co., Chicago, and Graybar Electric Co., New York, as distributors in United States of copper weld, rubber covered, telephone wire.

Capacity in Steel Ingots Has Increased in the Past Ten Years Nearly 30 Per Cent

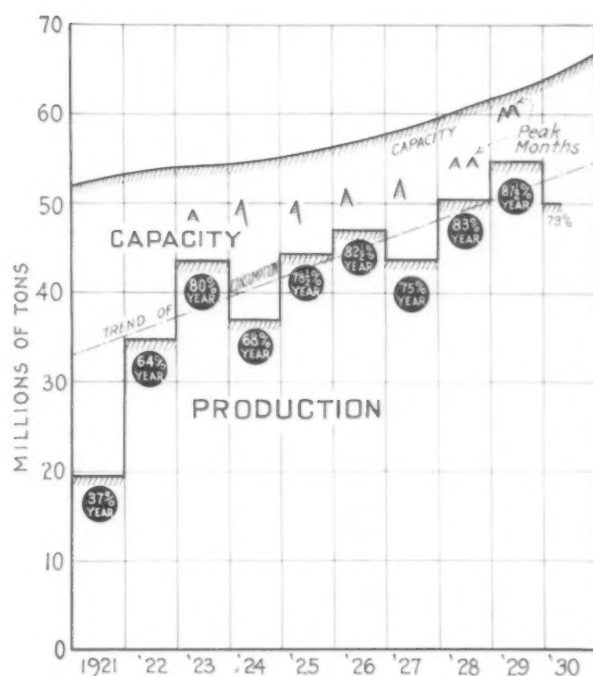
PERFORMANCE of 1930 in steel is the subject of some of the subjoined paragraphs, in which references are made to the accompanying chart. The capacity figures are those of THE IRON AGE except for the years 1925-1928 inclusive, which were compiled by the American Iron and Steel Institute

PEAK months, marked on the diagram below the capacity curve, indicate that there was generally a margin between the peaks and total capacity of 7 to 10 per cent. The exceptions were for the notably high outputs of March, May and June of last year. At times in those months production must have been at substantially full capacity, because for each of those months the gap between performance and possibilities was not much more than 2 per cent.

CAPACITY at the end of 1930 will apparently be close to 67 million tons. The line of increasing consumption (ascertained by a balancing of the ups and downs of production over a period of years) suggests that the rate of growth in new capacity is fully warranted. Actual parallelism between needs and capacity would require a steeper upward slope for the capacity curve than indicated, though it is likely that consumption in the next few years will not continue at the present indicated rate.

SO far in 1930 production in tonnage is close to that of 1928, but it represents a 79 per cent engagement of capacity, whereas operations in 1928 (for the whole year) were at an 83 per cent rate.

THE three-year cycle idea seems to have a grip on numbers of statisticians. It carries the implication that 1930 is to be another low year in three. Suggestions



are that 1930 will compare with 1924 rather than with 1927 and of course not at all with 1921. If, by this, one is to expect proportionally as much of a recession from 1929 as 1924 was from 1923, operations should average about 74 per cent. (In other words, a drop from 87½ per cent in 1929 to 74 per cent in 1930 is roughly proportional to the drop from the 80 of 1923 to the 68 of 1924).

FOR 1930, a 74 per cent scale of operations would mean 48¼ million tons, or 4½ millions more than in 1927 and smaller only than the production of 1928 and 1929.

OUTPUT in 1930, checking again with 1924, may be off 10 per cent from current needs. This would

likewise call for 48¼ million tons, because needs of 1930 are put at 172,000 tons a day (53.6 million tons per annum) and production 10 per cent off means an output of the order of 155,000 tons a day for 311 days (including electric and crucible as well as open-hearth and Bessemer steel). In 1924 needs were 131,000 tons daily and production 118,000 tons, or 90 per cent of needs.

IF the statisticians are right, the remaining eight months of this year cannot average as well as the four that have passed. The first third produced at close to a 50-million ton rate, yet the year is set for some 48 million tons. This would preclude a revival in the late months, though such is widely expected, unless there are lower spots in the summer months than now are believed likely. Those who look for a dull last quarter are in the very small minority. All of which is to admit that forecasting by means of the brute figures without some knowledge of current conditions has its shortcomings although there are many who like to check intuitions with statistical indicators.

The "New" Competition Is Lusty

THE competition of industry against industry that some years ago received the name "new" is still lively. We of the metal-working trades realize it. We are not alone concerned with threats of displacement by some outside industry, for we are aware of a vigorous interplay of groups within the field. New applications of scientific research and rapid advances in the metal-using arts are definite, welcome factors in current progress, but they set up realignments that may have a profound effect for good or bad on one's own business.

This is where THE IRON AGE serves. It brings to each reader the details of developments and trends in competitors' lines of metal working as well as his own. Not only the technological but the commercial and economic movements also are watched, and the coverage is of a breadth and conciseness that makes THE IRON AGE

The Complete Journal of the Whole Metal-Working Industry

This Issue in Brief

Real need exists for an alloy impervious to sulphur attack, and having strength at high temperatures. Addition of nickel increases strength at high temperatures, but reduces resistance to sulphur gases. High chromium resists sulphur gases, but has not the strength of the nickel-chromium alloy.—Page 1277.

Cast iron takes the place of welded steel. Because of its springiness, welded steel assembly was found difficult to machine. Welded forms were quite easily sprung out of shape in handling, so it was necessary to go back to iron castings in a number of cases.—Page 1281.

Best to pour chromium alloy castings on the cold side. The correct pouring temperatures are difficult to determine. High pouring temperature causes large grains and consequent brittleness and porosity.—Page 1278.

Handbook tensile strength value for cast iron is wrong, says engineer. Instead of 15,000 to 25,000 lb. per square inch, it should be 25,000 lb. to 60,000 lb. A new table is needed.—Page 1281.

Much money can be saved by X-raying castings before expensive machining. The X-ray will reveal hidden defects and thus eliminate losses occasioned by machining defective castings.—Page 1291.

Great compressive strength of gray iron is often overlooked by engineers and designers. It ranges from 80,000 to 200,000 lb. per sq. in., compared with about 60,000 lb. for carbon steel. This property is not considered so often as it might be, since most designs are figured with tensile strength as a basis.—Page 1281.

Properties of the more expensive alloy steels, at considerably lower cost, are approached by intermediate - manganese steels. Manganese ranges from 1.10 to 1.60 per cent, and carbon from 0.22 to 0.37 per cent. Addition of 1 per cent silicon is believed by some to give better strength.—Page 1295.

Foundry costs can be cut by X-raying the first few castings made from a new, complicated pattern. The "pilot" castings will reveal defects due to the design, or to the arrangement of gates, risers and vents.—Page 1291.

Great mistake to make all kinds of iron castings in the same foundry, says engineer. Cast iron can hold its place if foundrymen learn to pick their field and stay in it. Specialization means prosperity for the gray iron industry.—Page 1284.

Malleable iron annealing oven has very accurate temperature control. Tunnel type oven has three heating zones. Cross-section of mass to be heated is relatively small.—Page 1288.

No such thing as "permanent" molds. Better use the term "long-life" mold, for no metal now existent can be used repeatedly without developing firecracks, due to the high temperature.—Page 1292.

Real costs of welded construction are as yet problematical, says Steel Corporation executive. For no shop has had sufficient volume of work to permit continuous operation of a welding crew. But, he says, trusses properly designed for welding are cheaper than riveted work, because of the 20 to 25 per cent weight saving.—Page 1321.

"Long-life" molds last longer if coated with graphite. The graphite flakes "shingle" the mold surface and prevent penetration by the metal.—Page 1293.

Easily machined, strong, sound gray iron castings are made in electric furnace from 100 per cent scrap. Tensile strength is about 40,000 lb. per sq. in. and hardness is the same as the cupola mixture. Castings are free from pin holes.—Page 1319.

Air-hardening properties conferred by molybdenum are causing it to replace both nickel and vanadium in many alloy steel casting compositions. It is especially desirable for use where the large size or intricate shape of the casting prevents liquid quenching.—Page 1296.

Welders exhibit differences of opinion concerning tests of welded pressure vessels. Much discussion over tests proposed by boiler code committee of the A.S.M.E. Inability to agree may justify A.S.M.E. in retaining opinion that it has never been given proof of safety of welded construction.—Page 1320.

Saving of 35 per cent of fuel made by new air furnace recuperator. Average coal consumption test run was 591 lb. per ton of iron melted. Melt of 13 tons required but 175 min.—Page 1298.

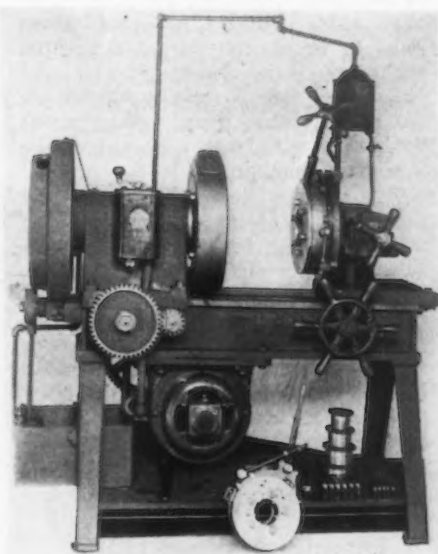
Not always easy to determine whether it is better to use a simple, relatively inexpensive steel drastically heat treated, or a more complex steel given a milder treatment. Experience alone determines which is the more economical.—Page 1296.

Improved Pipe Threading and Cutting Machine

A COMPACT pipe threading and cutting machine which may be arranged for either belt or motor drive has been brought out by D. Saunders' Sons, Inc., Yonkers, N. Y. Two sizes are made; the range of the smaller machine, the No. 4B, is from ½ to 4 in. inclusive, and that of the larger, the No. 5B, 1 to 6 in.

For motor drive a 3-hp. constant-speed motor is furnished for the smaller machine and a 5-hp. motor for the larger. Electrical equipment includes a drum-type controller for forward and reverse speeds. The motor is geared to the driving shaft of the machine, and speed changes are obtainable through change gears, sufficient gears being furnished to take care of all sizes of pipe within the capacity of the machines.

Each machine is equipped with two adjustable expanding die heads with chasers to thread all sizes within



THE Motor-Driven Machine Is Equipped With Reversing Drum Type Controller. New adjustable expanding die heads are furnished

range of the machine. The cutting-off head is arranged with a tool slide and self-centering V-jaws to steady the pipe being cut. The carriage mounting the cutting-off and die heads is operated by handwheel through rack and pinion. It is arranged with the die head on front, sliding in ways, which allows bringing the die head close to the universal gripping chuck used for holding the pipe. After the pipe has been threaded and is to be moved to adjust it for cutting-off, the die head may be pushed to one side to allow the pipe ample room to pass through the cutting head. In not passing through the die head, possible injury to the chasers from having the pipe slide over them is obviated.

A two-jawed self-centering chuck at the rear end of the spindle, on the side of the large driving gear, serves to center the pipe. Equipment in-

cludes a pump which automatically supplies a constant flow of oil to the chasers and cutting-off tool, and a reaming attachment. Floor space occupied by the No. 4B machine is 2 ft. 2 in. by 4 ft. 8½ in., and by the No. 5B machine, 2 ft. 4 in. by 5 ft. 6 in. The weight complete is 1850 lb. and 3400 lb., respectively.

Recessed Nut to Stop Tank Leakage

THE problem of leakage in bolted steel tanks has been attacked by the Columbian Steel Tank Co., Kansas City, through use of a recessed nut and suitable gasket, which is pressed



into the recess in the nut, to make a liquid-tight tank.

Any gasket material may be used, such as chemically treated paper, fiber or rubber, according to the type of liquid to be stored. Heretofore it has been necessary to drive the bolts through the rubber packing and depend upon the ragged edge to crowd itself around the bolt to make it leak-proof, always an uncertain method.

Develops Table Attachment for Portable Saw

BY means of a table attachment, recently devised, the Speedmatic electric saw manufactured by the Porter-Cable Machine Co., Syracuse, N. Y., may be used as a production stationary, as well as a portable unit. The change to a table saw may be made quickly by loosening a thumbscrew, no wrenches being required.

The swivel base upon which the arm of the attachment swings has a graduated scale 60 deg. each side of zero, although the arm can swing in a full circle. Making a compound cut merely requires loosening a thumb-



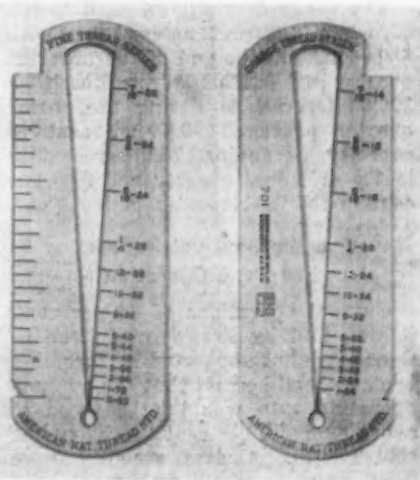
The Swivel Base and Arm Attachment Permits Portable Unit to Be Used as Table Saw for Production Work

screw and tilting the saw blade to any angle up to 45 deg. Depth cutting from 0 to 2¼ deg. can also be accurately secured through a second thumbscrew, permitting such work as fluting, stripping and dadoing to be done. For ripping, the position of the saw is quickly changed over to another segment on attachment. The arm is then pulled out and locked by a thumbscrew at any desirable width. For this type of cutting, the work is fed into the saw. An angle gage permits bevel ripping up to 45 deg.

The table attachment is made of cast iron and the ways are dovetailed and gibbed to take up wear. It can be fastened to any table by means of three bolts. The weight of the device, including the saw, is 52 lb.

Gage Facilitates Getting Screw Thread Sizes

THE size of American National and United States standard screw threads, both coarse and fine, may be determined quickly by means of the gage illustrated, which is being mar-



One Side of This Screw Gage Is Graduated for Fine Threads and the Other Side for Coarse Threads

keted by the Brown & Sharpe Mfg. Co., Providence.

One side is graduated for the fine thread series, as shown, and the other side for the coarse series. On the outer edge of one side of the gage there is a 3-in. scale graduated in ¼ in., which may be used for measuring the length of screws. Slots at each end of the scale permit setting the heads of both round and flat headed screws against a stop when being measured. The gage is designated as the No. 701.

Bethlehem Reports Good Earnings

President Grace Says, However, That Orders Do Not Support 84 Per Cent Operating Rate

THE Bethlehem Steel Corporation reported net income for the first quarter of \$10,077,486, or slightly more than the \$10,046,197 earned in the final quarter of last year and considerably above the \$9,045,590 reported in the first quarter of 1929.

Earnings during the first quarter, after deducting all charges and dividends on the preferred stock, were equal to \$2.60 a share on 3,200,000 shares of common stock, as compared with \$2.75 a share on 3,013,333 shares, the average number outstanding in the 1929 fourth quarter, and \$4.05 a share on 1,800,000 shares outstanding in the first quarter of last year.

Bethlehem's bond retirement program showed up in the amount set aside for interest charges, the total for the past quarter having been \$2,162,049, as compared with \$2,780,575 in the first quarter of last year.

The value of orders on hand March 31, was \$73,333,010, as compared with \$86,060,883 at the end of the previous quarter and \$62,702,683 on March 31, 1929. Operations during the recent quarter averaged 80.8 per cent of capacity, as against 76.8 per cent in last year's final quarter and 91.9 per cent in the first quarter of last year.

Incoming Business not Supporting 84 Per Cent Operation

Current operations of 84 per cent, it was said by President Eugene G. Grace, are not supported by incoming business, and he said that the average operating rate would be reduced to about 80 or 81 per cent by the end of this month. Orders recently have been equal to 75 to 80 per cent of capacity output.

The fairly good operating rate of the first quarter was made possible by a substantial carryover from last year of orders for rails, structural material and car-building steel. As some of this business has been worked off, the new tonnage to take its place has not been sufficient to warrant a continuance of the recent operating rates.

Mr. Grace said that railroad car business is quieter, but that moderate gains in orders for structural steel

and automobile steel have been made this month. The shipbuilding program, he said, is promising, and, even without the new ships that are soon to be contracted for, the shipbuilding industry is operating at the best rate since the war.

Price Tendency Toward Weakness

Steel selling prices are not increasing, Mr. Grace said, but in the main are holding at current levels, with a tendency toward the weak side. The average billing price of steel products shipped by Bethlehem during the first quarter was \$1.33 a ton below the average for the preceding quarter.

Comparison of Earnings

A comparative statement of the results of business and operations for the recent quarter and for the first and last quarters of 1929 is in the table.

Training Courses Offered by Ohio Companies

New mechanical training courses will be initiated May 1, by the Patterson Foundry & Machine Co., and the Patterson Steel Products Co., East Liverpool, Ohio, according to an announcement of R. L. Cawood, president of both companies.

The courses are restricted to residents of East Liverpool and neighboring towns. They are open to young men 18 years of age or older who are high school graduates or through home study or other means have the equivalent of a high school education.

Applicants will be required to serve three months probation at nominal remuneration; if successful they begin the 2½ years training course, receiving wages calculated to make them independent of other support.

The plan includes a professional course and a trades course. The professional course will fit the students for mechanical engineering, drafting and salesmanship. In addition to experience in the machine shop, foundry, pattern department, steel products department and laboratory, this course includes a complete mechanical

course in the International Correspondence Schools. The course will include library reference work and bi-weekly lectures.

The mechanical trades course is intended to fit the student for machinist, molder, pattern maker and welder. It will include preliminary training in all departments during the first six months, the student finishing the course during the last two years with apprenticeship and specialized instructions in the trade he may select. Library reference work and bi-weekly lectures are given, but theoretical training by mail is not included in the trades course.

Instrument Manufacturer to Occupy New Plant

A new plant in Brooklyn on Park Avenue, between Nostrand Avenue and Sandford Street, has been acquired by the C. J. Tagliabue Mfg. Co., instrument manufacturer, now in the Bush Terminal. The new building, which will be occupied about July 1, is of concrete construction with five stories, basement and pent house, and provides about 300,000 sq. ft. of working floor space, about double the space now occupied by the Tagliabue company.

The various departments for the manufacture of indicating, recording and controlling instruments for temperature, pressure, humidity, time, condensation and liquid level, laboratory and industrial thermometers, hydrometers and oil testing instruments, have been planned so that from point of introduction of raw material to the completion of the finished products straight-line production is maintained.

Dismissal Wage Gains Wider Acceptance

Paying a dismissal wage to workers discharged through no fault of their own is finding increasing application in industry, according to the United States Bureau of Labor Statistics. Although the principle of the dismissal wage has not yet gained wide acceptance, it has been adopted recently by a number of firms which were obliged to dismiss workers because of changes in production methods, curtailed production, plant mergers, or for other reasons over which the workers themselves had no control.

While the dismissal wage does not contribute materially to the solution of the unemployment problem, it is of very real assistance in giving the dismissed worker an opportunity to conduct a wider search for a new job, or to adjust himself to his reduced income. It may also have the effect of reducing unemployment in the individual plant, by curbing any tendency on the part of the employment manager or foremen to discharge employees for insufficient reasons.

	First Quarter, 1930	Fourth Quarter, 1929	First Quarter, 1929
Total income of the corporation and its subsidiary companies.....	\$15,846,506	\$16,444,519	\$15,245,471
Less—interest charges.....	2,162,049	2,904,419	2,780,575
Balance	\$13,684,457	\$13,540,100	\$12,464,896
Less—provision for depletion, depreciation and obsolescence	3,606,971	3,492,903	3,419,306
Net income for the period.....	\$10,077,486	\$10,046,197	\$9,045,590
Less—dividends:			
Preferred stock.....	\$1,750,000	\$1,750,000	\$1,750,000
Common stock	4,800,000	4,800,000	2,400,000
Total	\$6,550,000	\$6,550,000	\$4,150,000
Surplus for the period.....	\$3,527,486	\$3,496,197	\$4,895,590

Steel Corporation Earned \$3.44 a Share

Expects 80 Per Cent Operations Through First Quarter and a Satisfactory Last Half

EARNINGS of the United States Steel Corporation for the first quarter of 1930 were \$49,615,397, compared with \$56,385,334 for the last quarter of 1929 and \$60,105,381 for the first quarter of 1929. The net available for common dividends was \$3.44 for each of 8,560,876 shares outstanding in the first quarter, or nearly twice the dividend rate of 1 1/2 per cent maintained. In the preceding quarter, earnings available per share of common stock were \$4.14 for 8,132,840 shares and in the corresponding three months of last year they were \$5.04 per share.

Special income described as "quarterly apportionment of net interest on Federal tax refunds" amounted to \$2,396,636. The principal figures of the earnings statement are given in the accompanying table.

The finance committee of the United States Steel Corporation authorized the following statement in regard to the business of the corporation:

"During the quarter shipments to the trade equalled about 81 per cent of capacity compared with 74 1/2 per cent in the fourth quarter of 1929, and 94 per cent in the first quarter of last year. The earnings for the first quarter of 1930 were 20 per cent below those for the corresponding quarter of 1929, with an output which was 14 per cent less than last year. Prices averaged about \$1.45 per ton less than a year ago as to domestic business; but on export business the average prices showed an increase.

"In 1930 to the close of the first quarter new business booked has slightly exceeded in tonnage the current shipments. At the present time the plants are operating at about 80 per cent of capacity. The present indication is that this ratio will be fairly well maintained through the

second quarter, and while it is impossible to estimate at the moment as to the third and fourth quarters, the general indications are that there will be a satisfactory volume of business during the last half of the year."

Institute of Metals Lecture and Fall Meeting

The twentieth annual May lecture of the Institute of Metals (British) will be delivered on May 7, by Maj. F. A. Freeth, joint research manager Imperial Chemical Industries, Ltd., on "The Influence of Technique on Research."

Southampton, England, will be the location of the fall meeting of the institute, Sept. 9 to 12. At the morning sessions metallurgical and engineering papers will be presented for discussion and the afternoon will be devoted to visits to plants in the neighborhood, as well as one to the Portsmouth dockyard. A luncheon has been arranged on board the Mauretania by invitation of the Cunard Co. Following the sessions, a novel excursion is being arranged in the form of a trip to France and back in Atlantic liners. The party will cross to Cherbourg on Sept. 13, in the Mauretania, returning on Sept. 16, in the Berengaria. From Cherbourg motor excursions have been arranged to Mont St. Michel, Dinard, and other places.

Members of the institute are invited to participate in the sixth international congress of Mining, Metallurgy and Applied Geology at Liège, Belgium, June 22 to 28, held in connection with the international exhibition at Liège.

Wisconsin Steel Lights New Furnace

The Wisconsin Steel Co., Chicago, lighted its new blast furnace on April 21 and blew out and is dismantling its "A" furnace, which was built 50 years ago.

To Simplify Abrasive Grain Sizes

Approval of a tentative simplified practice recommendation relating to abrasive grain sizes will be considered at a general conference to be held Thursday, May 8, 10 a. m., in room 301, Industrial Building, Bureau of Standards, Washington.

The conference is being called by the Division of Simplified Practice of the Bureau of Standards, at the request of the technical committee of the producers of electric furnace abrasives. Items to be discussed in-

clude establishment of a date from which the tentative or modified recommendation shall be effective for new production, and the appointment of a standing committee to sponsor the recommendation and to take care of any revisions that may be necessary from time to time. Standard samples of grain sizes will also be considered.

Suit Filed to Block Steel Merger

Interests opposed to the merger of the Youngstown Sheet & Tube Co. with the Bethlehem Steel Corporation have filed suit for a permanent injunction in the Common Pleas Court at Youngstown. The petitioner is Myron C. Wick, Jr., who represents Cyrus S. Eaton and associates, and the Sheet & Tube company and Bethlehem are named as defendants.

This week counsel for the merger opponents began taking depositions. The first to make a deposition was Samuel E. Bool of Pickands, Mather & Co., Cleveland, who stated that his firm had purchased about 60,000 shares of Sheet & Tube stock prior to the special stockholders' meeting which voted upon the merger, and that prices ranging from \$150 to \$160 a share were paid.

Opponents of the merger contend that the merger proponents had no right to vote this stock.

J. G. Pearce Addresses New England Foundrymen

The New England Foundrymen's Association held a special meeting on Tuesday, April 29, at the General Electric Co.'s Everett, Mass., plant, to listen to an address by J. G. Pearce, director of the British Cast Iron Research Association.

Mr. Pearce, who will address the American Foundrymen's Association at Cleveland, plans to give several lectures throughout the East prior to going to Cleveland. His talk on cast iron research and the test bar situation, accompanied by an illuminating treatment of cupola practices in England and on the Continent, was made possible by the General Electric Co. invitation to him to visit its Massachusetts plants.

Mr. Pearce takes several exceptions to the common practice in the use of test bars, and points out that research in the gray iron casting industry must, from necessity, be of much broader scope than heretofore, if that industry is to hold its own.

The Gilbert & Barker Mfg. Co., the Rolls-Royce of America, Inc., the Van Norman Machine Tool Co., the Morgan Envelope Co., the Standard Electric Time Co. and United States Spring Bed Co. were the winners in February in the industrial accident prevention contest being conducted by the Springfield Safety Council.

Earnings of United States Steel Corporation

	Total Earnings
Jan., 1930.....	\$15,404,359
Feb., 1930.....	16,107,410
March, 1930.....	18,103,628
Total for quarter.....	\$49,615,397
Less, charges and allowances for depletion, depreciation and obsolescence.....	14,813,529
Net income.....	\$34,801,868
Deduct: Interest on bonds: Subsidiary companies.....	\$1,406,428
Corporation bonds.....	14,269
	1,420,697
Balance.....	\$33,381,171
Add, special income receipts..	2,396,636
Total.....	\$35,777,807
Dividends: Preferred, 1 1/2%.....	\$6,304,919
Common, 1 1/2%.....	14,981,533
	21,286,452
Surplus for the quarter	\$14,491,355

Fabricated Plate Orders Are Better in March

WASHINGTON, April 26.—Orders for fabricated steel plate in March totaled 35,985 tons, or 45.7 per cent of the capacity of the 48 firms reporting to the Department of Commerce. There was an increase of 7653 tons, or 27 per cent, over bookings in February.

For the first quarter orders aggregated 114,393 tons, or 48.4 per cent of the reporting capacity, comparing with 149,117 tons, or 62.2 per cent of capacity, for the first quarter of last year.

March orders were distributed as follows: Oil storage tanks, 5575 tons, the smallest since last December; refinery materials and equipment, 4301 tons; tank cars, 4914 tons; gas holders, 1819 tons, the smallest since last December; blast furnaces, 2749 tons, the largest amount since January, 1925; stacks and miscellaneous, 16,627 tons, the largest since last August.

Orders for the first quarter of 1930 were distributed as follows: Oil storage tanks, 20,872 tons, compared with 49,099 tons a year ago; refinery materials and equipment, 13,515 tons; tank cars, 24,155 tons; gas holders, 8330 tons, against 14,030 tons last year; blast furnaces, 4070 tons, compared with only 1051 tons in first quarter of 1929; stacks and miscellaneous, 43,451 tons.

To Exhibit Mechanisms and Models of Machines

More than 200 recently acquired mechanical movements, machine models and combinations of driving mechanisms will be put on view May 15 at the Newark Museum of Art, Science and Industry, 49 Washington Street, Newark, N. J.

The exhibit will include models of machines and mechanisms in the fields of power generation, transmission and measurement; hydraulics; manufacturing equipment; mining; and textile processing.

Armco Plant Makes Safety Record

At midnight, on April 22, Middletown works of the American Rolling Mill Co., Middletown, Ohio, had set a new Armco plant safety record by completing 1,300,000 man-hours without lost time because of an accident. The record which started Feb. 21, 1930, is still running. Middletown held the previous Armco plant man-hour record.

In 1929 the Middletown plant had 32 accidents for the period to date for which they now have two. During the same period in 1929, the company as a whole had 86 accidents. In 1930 this has been reduced to 26.

To date in 1930, the Middletown plant has gone two months of three, without losing time because of an accident. Six of the eight safety groups

of the plant have not had lost time because of an accident in 1930. The other two have had one each, both in February. April was clear also at the time this report was issued. The Middletown plant includes all operations from open-hearth to shipping of the finished sheet.

The entire Armco organization recently set a new company safety record when all the plants of the corporation went 11 days without a lost-time accident. The previous Armco record was 10 days.

Progress Made in Tests of Automotive Materials

Impressions of the present tendencies and the future promise of general methods, or "styles," of testing automotive materials were given by Prof. H. F. Moore, research professor of engineering materials, University of Illinois, in his paper, "Recent Progress in Tests for Automobile Materials," delivered by him at the symposium on materials for automobiles at the regional meeting of the American Society for Testing Materials in Detroit, March 19. Professor Moore's paper is written from the viewpoint of an "outside observer."

Three kinds of structural damage are mentioned: First, elastic failure, such as the bending of a front axle; second, flow or creep, such as the slow distortion of a valve spring; third, fracture or actual breakage.

Professor Moore suggested that non-destructive tests, which would detect the first stages of structural damage, would be a decided boon to the science of materials. He cites automotive engineers as having been pioneers in applying one such non-destructive test to finished parts, namely, the Brinell hardness test.

Smaller Consumption of Coking Coal

WASHINGTON, April 29.—Total consumption of coking coal at by-product plants in March amounted to 6,386,257 tons, compared with 6,656,314 tons in March, 1929, a decrease of 270,057 tons, or 4.1 per cent, according to the Bureau of Mines.

With the exception of New England, where an increase of 18.7 per cent occurred, a decrease is reported for each producing region. The most significant decline is shown by Illinois-Indiana, where consumption was 10.3 per cent less than a year ago. Other regions report more moderate losses, ranging from 1.7 per cent in the Middle Atlantic region to 5.9 per cent in Ohio.

Cleveland Quarries Co., Cleveland, has appointed L. Best Co., Inc., 28 West Broadway, New York, as export representative and domestic distributor for loose and mounted grindstones. Best company also represents Sterling Grinding Wheel Co., Tiffin, Ohio, subsidiary of Cleveland Quarries Co.

Steel Window Makers Adopt Trade Practice Rules

WASHINGTON, April 29.—The Federal Trade Commission has promulgated trade practice rules governing the solid section steel window industry. The industry held a conference in Washington on Nov. 18, 1929, with Commissioner C. H. March. Approximately 98 per cent of the volume of production was represented.

The rules adopted for the solid-section steel window industry cover such practices as inducing breach of contract, misbranding, secret payment of rebates, defamation of a competitor, enticement of a competitor's employees, threats of suit for patent or trademark infringement and unlawful price discrimination.

Engineering Inspection Interests Organize

The National Engineering Inspection Association was organized at a meeting held recently in Detroit by inspecting engineers and representatives of testing laboratories that are engaged in testing and supervising the manufacture and use of various engineering materials for construction work. The membership consists of 20 individuals, partnerships or corporations distributed throughout the country, seven from the eastern section, seven from the midwestern section and southwestern sections and six from the western section.

The object of the association as stated in the constitution is to promote a proper understanding and cooperation among those engaged in and concerned with engineering inspection, to establish practices which will prove beneficial to proper service and to encourage better and more effective inspection methods. It is planned to hold semi-yearly general meetings.

The officers elected were: President, Watson Vredenburg, president, Hildreth & Co., Inc., New York City; vice-president, J. D. Stoddard, vice-president, Detroit Testing Laboratory; secretary-treasurer, B. H. Witherpoon, president, Pittsburgh Testing Laboratory. The board of directors includes the officers and a representative from each of the four geographical sections of the country as follows: Henry Gulick, president, Gulick-Henderson Co., New York, eastern section; James H. Herron, president, James H. Herron Co., Cleveland, midwestern section; F. B. Porter, president, Southwestern Laboratories, Fort Worth, Texas, southern section; Abbot A. Hanks, president, Abbot A. Hanks, Inc., San Francisco, western section.

Truscon Steel Co. reports net earnings for first quarter, after all charges, of \$130,905, comparing with net of \$201,411 for same period in 1929 and \$90,275 for the first three months of 1928.

PERSONALS

FREDERICK H. PAYNE, chairman of the board of the Greenfield Tap & Die Corporation, Greenfield, Mass., has been nominated Assistant Secretary of War by President Hoover. The nomination was sent to the Senate for confirmation last week. Colonel Payne began his business career in the First National Bank of Greenfield. He became bank examiner of



Frederick H. Payne

the State of Massachusetts and after three years he was elected president of the Mechanics Trust Co., of Boston. In 1912, he organized the Greenfield Tap & Die Corporation, becoming its first treasurer. Four years later he was elected vice-president and general manager, and in December, 1919, he was made president, which position he held until he was made chairman of the board in January, this year. During the war Colonel Payne served as a major in the Ordnance Department, in charge of procurement activities in the Bridgeport district, and since 1923 has been assistant district chief of the Bridgeport Ordnance district.

T. HOLLAND NELSON of the Midvale Co., Philadelphia, will address the May meeting of the Cincinnati chapter of the American Society for Steel Treating on May 2, at the Engineers Club, Cincinnati. His subject will be "Alloy Castings for Non-Corrosion and Heat Resistance."

R. J. HARRY, who as announced in THE IRON AGE of April 24 has resigned as assistant superintendent of the electrical department of the Carnegie Steel Co., Homestead works, has become general sales engineer of the Alliance Machine Co., Alliance, Ohio. He had been with the Carnegie company for 25 years.

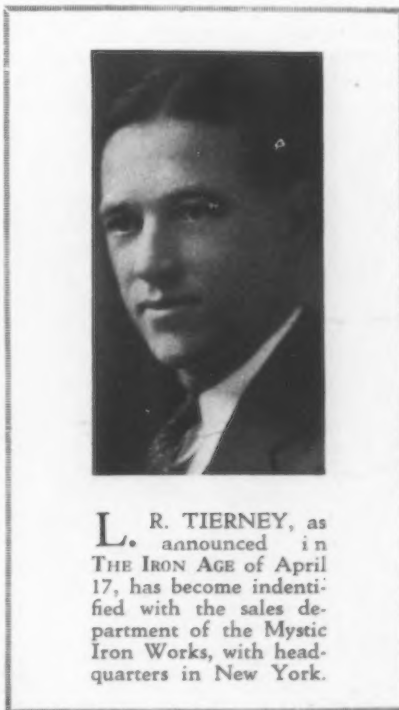
A. J. GAEHR, formerly first vice-president of the George Worthington Co., Cleveland, has been elected president to fill the vacancy caused by the death of William D. Taylor. H. E. HULBURD, who was second vice-president, has been elected vice-president and J. G. SCHULLIAN, who has been secretary and assistant treasurer, has been made secretary and treasurer.

H. L. MILLER, for a number of years chief engineer of the Buda Co., Harvey, Ill., has become manager of the electric railway division of the Pettibone Mulliken Co., Chicago. Before his association with the Buda Co., he was identified with the frog and switch department of the Pennsylvania Steel Co.

PAGE GOLSAN, recently vice-president of the Great Western Portland Cement Co., has been appointed manager of the new business department of the engineering organization of Ford, Bacon & Davis, New York.

RALPH A. SHERMAN, who has been fuel engineer with the Pittsburgh Experiment Station of the United States Bureau of Mines, has been added to the staff of the Battelle Memorial Institute, Columbus, Ohio, to direct the program of research on combustion.

H. S. GRAY, who has been identified in a sales capacity for the past 19 years with the Pittsburgh Steel Co., has been made manager of the new district sales office of the company at Syracuse, N. Y.



L. R. TIERNEY, as announced in THE IRON AGE of April 17, has become identified with the sales department of the Mystic Iron Works, with headquarters in New York.

G. F. BLACKMER, general superintendent, and J. A. COAKLEY, general traffic manager of the American Steel & Wire Co., have been made vice-presidents of that company. No change is announced in their executive duties. B. H. LAWRENCE, who has been mechanical engineer, has been given the title of chief engineer. The headquarters of these officials is



Frank Baackes

in Cleveland. FRANK BAACKES, who has been vice-president with headquarters in Chicago, has been made assistant to the president.

WILFRED VAUGHN has been appointed general purchasing agent of the Heintz Mfg. Co., automobile bodies, Philadelphia.

W. E. TROUTMAN, Duquesne Steel Foundry Co., Coraopolis, Pa., has been nominated for the presidency of the Pittsburgh Foundrymen's Association for the 1930-31 season. H. F. SEIFERT, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has been nominated for the vice-presidency of the organization, and WILLIAM J. BRANT will again serve as secretary-treasurer.

T. G. HART, who has been associated with the Terry Steam Turbine Co., Hartford, Conn., since 1919, has been appointed general sales manager of the company.

L. K. SIMONS, for the past 10 years employed as an operating executive with the Van Alen Co., Northumberland, Pa., has joined the Reading Iron Co., Reading, Pa. Effective May 1, Mr. Simons will be in charge of operations at the Reading Iron Co.'s cut nail plant in Pottstown, Pa.

E. J. BLOCK, vice-president of Inland Steel Co., has sailed for an eight weeks' sojourn in Europe.

GEORGE E. SHEPARD has been appointed division contracting manager for the central division, Pittsburgh, of the American Bridge Co. to fill the vacancy caused by the recent death of Louis J. Affelder.

RUSSELL D. KNIGHT has been placed in charge of a new district sales office to be opened by the Pittsburgh Tube Co., Pittsburgh, at 2814 West Broad Street, Philadelphia.

HARRY SAXER, since October, 1929, assistant general superintendent of the Aliquippa, Pa., works, Jones & Laughlin Steel Corporation, has been appointed general superintendent of that plant, succeeding C. M. WHITE, who has resigned. Mr. Saxer has been identified with the Jones & Laughlin company for 20 years, and prior to his appointment as assistant superintendent at Aliquippa was for 12 years superintendent of blast furnaces and coke works at that plant. H. M. CARR, who has been superintendent of the wire department at Aliquippa, succeeds Mr. Saxer as assistant general superintendent. R. M. HUSSEY, superintendent of the electrical department, replaces Mr. Carr in the wire mill.

Chrome Ore in Furnaces

Two surveys on the use of chrome ore and chrome ore cement have been made by the Nielsen Co. for E. J. Lavino & Co., Philadelphia. One deals with laying up firebrick in furnaces and the other with laying up a monolithic forging furnace bottom. Copies of these surveys may be obtained by those interested, by writing to E. J. Lavino & Co.

"Studies in the Electrodeposition of Metals," by Donald B. Keyes, professor of industrial chemistry, and Sherlock Swann, Jr., research associate in chemical engineering, University of Illinois, Urbana, Ill., is the title of Bulletin No. 206, issued by the Engineering Experiment Station of the university. It covers the history of the electrodeposition of the more uncommon metals and the theory of their electrodeposition. There is a section on experimental work in electroplating. A valuable appendix discusses the method of electroplating small objects with aluminum.

American Locomotive Co. and subsidiaries in 1929 earned net profits of \$6,851,300, equal, after dividends of \$2,695,000 on 7 per cent preferred stock, to \$5.40 a share on 770,000 shares of common stock outstanding. Dividends of \$8 were paid on common stock during the year.

Personnel Changes in Republic Company

Tom M. Girdler, chairman of the Republic Steel Corporation, was elected president of that corporation at a meeting of the board of directors Tuesday to fill the vacancy caused by the death of Elmer T. McCleary. Mr. Girdler will serve both as chairman and president. Three new directors were added to the board, increasing its membership to 17. They are J. O. Eaton, partner of Otis & Co., Cleveland. John S. Brookes, Jr., associated with the Koppers interests, Pittsburgh, and D. W. Cooper, patent attorney of New York. Mr. Brookes was formerly a director of the Republic Iron & Steel Co. and Mr. Eaton formerly was a director and member of the executive committee of the Central Alloy Steel Corporation, now merged with the new company. The directors also appointed an executive committee composed of the following directors: W. G. Mather, J. O. Eaton, Edward B. Greene, Myron A. Wick, John T. Harrington, and Tom M. Girdler.

W. M. Neckerman, formerly vice-president of the Republic Iron & Steel Co., has been appointed assistant vice-president of the operating department of the Republic Steel Corporation. H. B. Carpenter, who has been superintendent at Youngstown, will be district manager of the Youngstown district. E. A. Portz, who has been general superintendent of the Central Alloy Steel Corporation plants, has been named district manager for the Central Alloy district and will be in charge of the Canton and Massillon plants. C. H. Elliott, now in charge of the Warren plants, has been named district manager of the Warren district. W. H. Oldham will continue in charge of the southern district with the title of vice-president, with headquarters at Birmingham. Kenneth D. Mann, previously district sales manager at Boston for the old Republic organization, has been made district sales manager at Birmingham and will succeed Norman Foy, who has been appointed sales manager of the mild steel division, with headquarters at Youngstown. A. G. Greenamyre, formerly with the Donner Steel Co., is named as district manager of the Buffalo district. J. L. Hyland has been appointed district manager of the Chicago district. C. A. Ilgenfritz, who has been director of purchases of the Central Alloy Steel Corporation, has been appointed director of purchases and Walter Massman, who has been purchasing agent of the Republic company, will continue in the same capacity. J. U. Anderson is treasurer and R. Jones, Jr., secretary. A. E. Walker has been made assistant vice-president in charge of sales and W. C. Gubbins, assistant comptroller. Frank Webb is manager of the ore mining department and George Morse, manager of the coal mining department. F. M. Cardwell

is appointed auditor, B. F. Boyer assistant auditor, W. B. Knuff chief cost accountant, E. P. Foley credit manager and C. D. Reese assistant credit manager. H. M. Hurd is assistant treasurer and G. H. Freehorn, who has been connected with Central Alloy, is also an assistant treasurer.

Packard Diesel Engine for Aircraft

THE new Packard Diesel engine for aircraft was described at the Detroit aeronautical meeting of the Society of Automotive Engineers. Capt. L. M. Woolson, who designed the engine, stated that it is built to use ordinary furnace oil, costing about 9c. a gallon, and will give the same performance with 10 gal. of oil that a gasoline motor gives on 13 gal. of gasoline.

Advantages claimed include elimination of fire hazard and general use of radio through the absence of spark plugs.

The Packard motor running speed has been increased to 2000 r.p.m., while the weight has been correspondingly reduced. Heretofore, Diesel engines of the lightweight variety have weighed around 20 lb. to the hp., while this engine weighs 2.26 lb. to the hp.

Cylinder barrels weigh 11½ lb. each. Each cylinder has a combination fuel-pump and nozzle unit to spray the oil into the cylinder. Operation of the air port and fuel pump is by a series of cams and rocker arms. Each cylinder operates independently of the others, probably the most important feature of the motor, because it insures maximum performance. One or more cylinders might go out without stopping the motor during flight.

The crankcase is a one-piece magnesium-alloy casting of rather large diameter. It supports, through the medium of a forged steel container, a deep-grooved ball-bearing at the front end, adapted to take both propeller thrust and radial load. A roller-bearing is mounted immediately ahead of the front crankshaft cheek. The engine uses aluminum-alloy pistons, with peculiarly shaped heads, to insure turbulence.

It was stated that the Diesel engine is not suited to use in automobiles. The problem of acceleration offers the principal reason. The airplane engine operates at least 80 per cent of the time at close to maximum efficiency, or at constant torque. The automobile engine operates not more than 20 per cent of the time at a high rate of speed and the car must stop and start frequently.

Since the foregoing description was put into type, Mr. Woolson met a tragic end as one of three flying in an airplane equipped with a Diesel motor on April 23. The machine in the midst of a sudden snow squall crashed into a hill at Attica, N. Y.

Gray Iron Exhibit at Steel and Foundry Shows

Directors of the Gray Iron Institute have approved plans for an exhibit of gray iron products at the May convention of the American Foundrymen's Association in Cleveland. An exhibit of gray iron castings will also be shown at the National Metal Congress to be held in Chicago in September.

The publicity department of the institute was requested to prepare plans for publishing an authentic history of gray iron. It is stated that there is an urgent demand for such a volume in libraries and educational institutions.

Chairman Johnson of the research committee reported that tests are soon to commence on test bars sent to the institute headquarters by members. On completion of this study, the institute will publish the first official set of recommended practices ever introduced into the gray iron industry. The board of directors recommended that institute members support the apprentice training program of the American Foundrymen's Association.

A luncheon meeting of institute members will be held Wednesday, May 14, in the Hotel Cleveland, Cleveland, during the week of the A. F. A. convention.

Finland Discovers High-Grade Iron Ore

A large iron range has been discovered in northern Finland. According to *Suomen Kuvalehti*, a Finnish weekly, these deposits are in the valley of Tornio and Muonionrivers, in the parish of Kolari, partly on State owned and partly on private properties.

Exploration not yet completed has revealed that the ore compares favorably in quality and quantity with that found in the mines of middle Sweden. It contains fully 50 per cent iron and much of it is free from sulphur. The better quality ore is in sufficient quantities to last 100 years if mined at the rate of 200,000 tons annually.

A few miles from the ore fields of Kolari are the largest limestone deposits in Finland.

Celebrate Anniversary

George Rahmann & Co., manufacturers of leather belting, 31 Spruce Street, New York, celebrated their thirty-fifth anniversary at a luncheon at Keen's English Chop House, New York, April 12. The firm was founded April 12, 1895, and two of its original employees remain with it today.

General Refractories Co., Philadelphia, has appointed Harry N. Crowder, Jr., Co., of Easton, Pa., as exclusive high temperature cement dealer in Lehigh and Northampton counties, Pennsylvania, and in parts of Warren and Hunterdon counties in New Jersey.

OBITUARY

CHARLES ECKERT YOUNG, who has long been connected with the brass manufacturing industry, died suddenly at his residence, 731 Vine Avenue, Park Ridge, Ill., April 27. His parents were among the early settlers in Chicago and Mr. Young was born there on June 9, 1878. He was formerly a director of the Ohio Brass Co.,



C. E. Young

Mansfield, Ohio, but returned to Chicago to operate his own advertising agency until he became connected with the Imperial Brass Mfg. Co., Chicago, in 1915, of which company he was vice-president, in charge of its Watrous plumbing division.

NILS FALK, secretary and treasurer of the Vanadium Corporation of

America, New York, died suddenly on April 21 while on a business trip at Salisbury, Southern Rhodesia, South Africa. Mr. Falk, who was 50 years of age, was for many years on the sales staff of the Carnegie Steel Co.

JOHN E. SWEET, secretary and purchasing agent of the Farrell-Cheek Steel Foundry Co., Sandusky, Ohio, died at St. Petersburg, Fla., of pneumonia. He had been with the company since 1910, and took an active part in its development until a few years ago.

WILLIAM A. DOUGLASS, who represented THE IRON AGE on the Pacific Coast in an advertising capacity for a number of years, died at Berkeley, Cal., April 14, aged 70 years. He became a Californian in 1905 and was active until about two years ago, when he retired on account of ill health.

ALEXANDER D. MORGAN, machinery expert, died suddenly, April 25, in the Boston Globe Building, Boston, where he maintained an office. He was born in Roxbury district, Boston, about 65 years ago and for several years was head of a B. F. Sturtevant Co. production department, and for a time prominently identified with the former Becker Milling Co.

WILLIAM BLACK, president, B. F. Avery & Sons, Inc., Louisville, Ky., maker of agricultural implements, died at St. Petersburg, Fla., on April 19.

Gray Iron Institute's Annual Meeting in October

Wednesday, Oct. 15, has been designated as the date for the annual meeting of the Gray Iron Institute which will be held in Cleveland. A. J. Tuscany, manager of the institute, reported to the board of directors that 30 district meetings have been held in various foundry centers this year and 48 new member companies joined the institute at these local meetings. A number of local chapters of gray iron foundrymen have been organized. Pioneer cities in this work are Chicago and Buffalo, where local chapters are effectively operated. In 14 other cities plans are nearing completion for launching local chapters. The institute is also closely working with a number of local foundrymen's associations.

It was stated that the standard cost system, published by the institute early in the year, has aroused wide interest and meetings at which the

cost program was explained were well attended. The institute manager was further authorized aggressively to promote the institute cost program both through local chapters and cost groups and through a wide educational program.

Aluminum Rolling Mill

In an article published in THE IRON AGE on March 6, page 707, describing the new blooming mill of the Aluminum Co. of America at Massena, N. Y., it was incorrectly stated that the manipulators and the shear are operated hydraulically. This mill equipment, which was furnished by the Mesta Machine Co., West Homestead, Pa., is operated electrically. The blooming mill itself, also built by the Mesta Machine Co., is the largest aluminum rolling mill in the world, designed to roll ingots down from 20 x 20-in. cross-sections. It has a spindle speed of 150 r.p.m., and reversing from that rate to zero requires only 0.6 sec.

W. W. MACON
Editor

THE IRON AGE

A. I. FINDLEY
Editor Emeritus

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The Commercial Man Is in the Saddle

THE war greatly increased both material and labor costs. It forced industry to concentrate as never before on developing new economies in manufacturing methods. It gave impetus to mass production—the familiar Ford formula of cutting costs by spreading overhead over a maximum output of standardized products. It raised to a new pinnacle of importance the industrial engineer and the plant manager, and they rose to the occasion so well that there were pilgrimages from abroad to study their work.

All ran smoothly while the new markets created by manufacturing economies were being exploited, but at length it was discovered, especially in the production of consumer goods, that demand had its limits. "Overproduction" and "profitless competition," not to mention "technological unemployment," became familiar terms. More and more manufacturers found themselves in closed markets—at least so far as this country is concerned—with their business dependent mainly on replacements and such increment as comes with growing population.

Of necessity attention has been centered on marketing problems. The commercial man is now in the saddle. Upon his strategy, his painstaking appraisal of both intra and inter-industry competition, his seasoned judgment of general business conditions and his unrelenting study of consumer requirements depend profit or loss on the balance sheet. Great plants, representing the last word in equipment and methods, are no longer considered assets per se. Orders must be captured to keep them running. Price of product is not enough, since inequalities in manufacturing efficiency have tended to disappear, evening out disparities in costs.

Undoubtedly refinements in plant methods are still possible and further technical advances can be expected, but the big bulge in demand that followed the large initial economies yielded by mass production is definitely a thing of the past. Exceptions must be made, of course, for industries that may arise to satisfy entirely new wants and for revolutionary scientific discoveries that the future may bring forth. For most manufacturers, however, marketing has displaced production as the prime consideration. The business weather map, the competitive scoreboard and the fluctuating demand barometer are the common concern of all men in industry.

AMONG suggestions made from time to time bearing on our manganese ore problem—particularly with reference to supplies in time of war—is one that

large quantities of imported ore be stored against an emergency. France meanwhile seems to have accepted the idea. In the last two years French importations have been 1,541,400 tons. Since her steel output has averaged only 9,500,000 tons in the past two years, manifestly the ore imports much exceed the amount necessary. In addition French imports of ferromanganese were over 11,000 tons last year and exports relatively small.

Where Is Steel Going Now?

BY anything like a long-range comparison, recent steel production has been heavy. In the last issue we pointed out that production in February, March and April represents only about 12 per cent decrease from last year, practically no change from 1928, and gains over all preceding years. The analysis dealt only with total steel production in the three months mentioned.

No doubt the showing created surprise in some quarters, as it is easy to overrate the dullness in some lines of trade, and an analysis of where the steel has been going is accordingly prompted. Means of weighting the importance of varying degrees of activity in different lines is furnished by the annual findings of THE IRON AGE of where steel went (issue of Jan. 2, 1930).

Three lines, railroads, building and construction and automotive, took roughly about one-sixth each. Oil, gas, water and mining ran a trifle over 10 per cent. Three other lines ran 5 or 5½ per cent—agriculture, containers and exports, while machinery accounted for 3 per cent and the balance, undistributed, totaled 19 per cent.

Railroads, accounting for 17 per cent last year, have been doing better so far this year than in the same period of last year. Freight car building was light early last year, installations by Class I roads being as follows: January, 1790; February, 2231; March, 5138; April, 7391; May, 9975. Since then installations have been remarkably uniform, averaging over 9000 cars a month. At the beginning of this year Class I roads had 34,083 freight cars on order, an ample amount to keep up the pace, and the number increased to 37,117 April 1. About three times as many freight cars were installed in the first quarter of this year as in the first quarter of 1929.

Rail orders for this year represented an increase, but as there was more anticipatory rolling, before Jan. 1, it is not certain that rail production has been heavier this year than last. In other lines of steel

consumption railroads have presumably been doing as well this year as last.

As to building and construction, representing another one-sixth of our steel, reports of total contract lettings turned downward after July of last year, the remaining months showing large decreases from a year preceding. Hence, no doubt, there was much less building under contract at the beginning of this year than at the beginning of last, but that tells us nothing as to character, for some building requires much steel, some scarcely any.

We have, however, one specific and important piece of information, the fabricated structural steel reports of the Department of Commerce. They show shipments of the fabricating shops in the first three months of this year at 812,000 tons, against 796,950 tons a year previous, making an actual increase, 2 per cent. Our annual finding showed 16½ per cent for all building and construction (outside of railroads); and fabricated structural steel, with an allowance for attendant reinforcing, elevators, pipe and numerous other items, must represent not under 10 per cent, or nearly two-thirds of the entire item.

Automotive needs, which took 18 per cent during all of last year, took a markedly higher percentage during the first four months, perhaps 22 to 23 per cent. Considering the number of cars produced this year and their light weight, there is a loss of slightly more than one-third, making, say, an 8 per cent hole in steel production this year.

Agriculture, at 5½ per cent, is doing substantially as well as last year, if not better. Containers, at 5 per cent, are doing well. Steel barrel shipments in January and February totaled 1,174,087, or 5.6 per cent more than last year. Tin plate mills have been running well.

Thus there is really only one important loss—that in the automobile industry.

The Foundry a Robust Institution

IN this issue THE IRON AGE salutes the foundry. At Cleveland, week after next, will be held another of the great exhibitions and technical convocations that are the cynosure of the whole industrial world. The virility of the industry has no stronger proof than these popular gatherings, intense in purpose, large numerically and notably stirring in promoting engineering progress.

The gray iron foundry is particularly to be singled out for the epic story of its recent wrestling with the problems of high-test iron, electric melting, alloy iron, cupola operation, long-life molds—most, if not all, a tribute to the influence of the Gray Iron Institute. Similarly, heavy debts are owing to those who have achieved such successes in shortening the time of producing malleable castings and malleable castings of progressively better physical qualities. And to indicate the remarkable advances in steel castings, especially those containing alloys, it is necessary only to recount the fact that a few years ago such products were never quenched and drawn. A spirited contestant in the battle of the "new" competition may be expected

in the Steel Founders Society of America, which has been reuniting the steel elements of the castings field in a vigorous way.

The foundry also owes its position in no small part to applying the results of research wherever it could and to an openmindedness in respect to new and promising items of equipment—spending in order to save. There are lessons in its behavior that competing branches of the metal-working field have not been slow to discover.

Welded Drums for Super-Power

DISCUSSION of specifications for fusion welding of drums or shells of power vessels is reported briefly on another page in the account of the meeting of the American Welding Society. The expressed attitude of the boiler code committee is that the construction shall above all else be safe, yet by the multiplicity of tests proposed one suspects that the members of that important committee are by no means confident that a welded boiler can have the assurance of safety reposed in riveted or seamless drums, and that they have turned to welding because developments in power design call for shells too thick to rivet and too big to forge.

While tests are no doubt important, the extended discussion of testing technique at the Welding Society neglected one fundamental consideration, namely, that it is impossible to guarantee success in operation by tests on the material, on the workmen, or even on the completed structure. In other words, there is no test for service; it is possible to determine the excellence of a new method of construction, such as a welded boiler drum, only by using it. This being true, it follows that the restrictive code on unfired pressure vessels, which has sharply limited the use of the new method to relatively small pressures and unimportant structures, has defeated its own end, because it has prevented that experience and use which is the sole guarantee of confidence.

This newly proposed code for welded boiler drums is to be welcomed, and should be approved despite doubt as to the propriety of some of the tests, if only it will enable some of these high-pressure cylinders to be made and used. The main question to determine, it seems, is not whether the proposed tests are sufficient, but whether they are not unduly burdensome and in large part meaningless because the results cannot be correlated with any quality of the joint, or any service characteristic of the completed boiler.

Those who would contest the premise that tests do not guarantee service should remember the railroad rail. Surely it is a constructional material which has received intense study for many years, yet no one can say, short of the most carefully conducted and extensive trials in track, whether a new steel, a new rolling program, or a new heat treatment, will be any better than the old standard. Examples could be easily multiplied. "But a rail is in complex service," is no adequate rebuttal. Boiler drums are by no means simple. They must endure high and variable temperatures, high thermal gradients and stresses, they have numerous openings where stresses concentrate, they are corroded inside and out, they may be subject to

severe overloads. Where is the test that can integrate these factors?

The only correct way to progress safely in such a dilemma is to make haste slowly. Acquire experience on the small before going to the large, and experience with the large before going to the great. Such sensible procedure is just now impossible because the boiler code committee has effectually limited welded construction to vessels in sizes which can be classed as pipe rather than as drums, shells or boilers. We do have plenty of experience with small pressure containers up to $\frac{1}{2}$ in. thick and capable of holding several hundred pounds static pressure.

Welding has been eminently satisfactory—of that there can be no doubt. We have some, but too little, data on manufacture and of experience with the large units. But it is too big a jump into the unknown to translate that meager experience into rules for the construction of mammoth vessels with walls 3 to 6 in. thick, drilled with hundreds of openings, and to carry superheated steam up to 1500 lb. No seasoned engineer could be confident of the result, lacking experience with similar structures of the same order of magnitude, even though it had received a hundred tests.

The World's Coal and Power

IT has been a notable thing that production of coal in the United States has had no material increase over the rate attained just before the war. As the amount of work done has greatly increased it has been concluded that, even after allowance is made for increased use of petroleum and natural gas, there has been developed greater economy in the use of fuel, methods being much more efficient. It is known, for instance, that public utility power plants have been heavily reducing their fuel consumption for each kilowatt-hour made. From 3.2 pounds in 1919 the decline has been uninterrupted, to 1.76 pounds in 1928—a drop of 45 per cent.

Production of coal by the rest of the world, on the other hand, has largely increased. One must therefore conclude either that the rest of the world has made still greater industrial progress than the United States or has not increased in combustion efficiency as has this country. The first alternative must be dismissed, while as to the second the chances are that the rest of the world has not been altogether as wasteful as the United States has been and thus

has had less opportunity for increase in efficiency.

Production of all coal, including anthracite and lignite, in 1913 was 1,342,000,000 metric tons, divided 518,000,000 tons for the United States and 824,000,000 tons for the rest of the world. Passing over the war years, in two of which the United States had quite extraordinary production, it was not until 1924 that the rest of the world definitely attained its pre-war production. Then there were continued gains except for a large backset in 1926, brought about by the British coal strike.

Preliminary figures for 1929 show a world production of 1,540,000,000 metric tons, divided 552,000,000 tons for the United States and 988,000,000 tons for the rest of the world, an increase over 1913 of 20 per cent for the rest of the world. It is true the bare figures show a 7 per cent increase for the United States in the same period, but the United States has a 1929 loss from 1923, from 1923-4 or from 1923-4-5.

We have it, then, either that the rest of the world has not been so progressive as the United States in introducing fuel economies, or was so far ahead of the United States before the war that there was not room for corresponding progress. We do know that fuel was used quite wastefully in the United States before the war, and that some foreign power plants were very economical by reason of coal being so dear. But abroad there were big divergences in the cost of coal, and the proportions of economically used and wastefully used coal can hardly even be guessed.

In 1912 and 1913 the proportion of world's coal produced in the United States was 38.8 per cent and 38.6 per cent respectively, and we may take that as basis for comparison. Since the war, percentages have varied widely, chiefly on account of special conditions. We had a low proportion in 1922 on account of the great bituminous strike, and a high proportion in 1923 when we were making up. Then there was a high proportion in 1926, when British production was greatly curtailed by a strike, while our production was up on account of exports. In the last three years our proportion has been respectively 36.8 per cent, 35.1 per cent and 35.8 per cent.

In the matter of water-power, more has lately been done abroad, and more is likely to be done, than in the United States. We have extremely cheap coal, considering commodity prices in general, while abroad coal is costly, particularly where water-powers are being developed.

Heat Transfer Problems and Blast Furnace Practice

DETERMINATION of the laws governing the transfer of heat from a moving gas stream to a bed of broken solids, such as iron ore, coke and limestone, is one of the essentials in the development of a complete quantitative theory of the blast furnace process. The charge of ore, coke and limestone acquires heat as it settles counter-current to the rising gas stream. Proper thermal and chemical preparation of the charge before it reaches the hearth depends upon heat acquisition. The efficiency of the furnace above the tuyeres is directly related to the efficiency of heat transfer and to the overall efficiency.

The United States Bureau of Mines, in cooperation with the University of Minnesota, Minneapolis, has found that the coefficient of heat transfer from a gas stream flowing through a bed of broken solids varies as the 0.8 power of the gas velocity and is practically independent of temperature. A general relation has been found between voids and heat transfer, but data are not extensive enough to determine a reliable mathematical relation. It seems likely that a definite relation between the resistance of beds to gas flow and coefficient of heat transfer will be developed.

The Week in Business

Drift of Current Financial
and Economic Opinion

MAINTENANCE, mostly unimpaired, of the individual's purchasing power, as shown by Easter sales in department and chain stores, is a feature of the business situation which the National Industrial Conference Board finds "at least encouraging." This same observation is made elsewhere and mild surprise is expressed that this purchasing power was "not seriously crippled by the stock market debacle."

But Theodore H. Price thus disposes of the securities bogy: "It will take time to convince people that dullness on the Stock Exchanges is not incompatible with prosperity. A period of comparative quietude seems to be ahead of the securities markets."

He finds "about the only untoward feature in the financial outlook" to be the belief that much of the (residential) building planned for the summer will be deferred until loans are easier to obtain. This scarcity of mortgage money is attributed not so much to a lack of the necessary funds as to disinclination on the part of borrowers to pay the rates which were demanded a year ago, when funds were mostly tied up in speculation. Hence, "expectations of an active building boom may be disappointed."

Generally slow improvement is

predicted by most observers. The Guaranty Trust Co. finds that the encouraging developments of increase in construction, greater commodity price strength and continued ease of money rates "are not alone sufficient to warrant expectation of a return to high levels of business activity in the immediate future. . . . The most optimistic forecast consistent with conservatism is that the worst is probably over, and that coming months are likely to show gradual and probably irregular improvement."

Similar views come from the Union Trust Co., Cleveland: "While there are prospects of good times ahead, the recent business recession still remains to be reckoned with, and it may take a considerable period of good business to offset [poor] first-quarter earnings."

Failure of business to stage a substantial recovery this spring appears to Alexander Hamilton Institute to postpone, until autumn, "the earliest probable date of a real revival." That organization finds, however, encouraging evidence that a foundation is being laid for a sound business recovery.

Four steps—the usual developments which foreshadow a business recovery—are said by that Institute to have been appearing in regular order: (1) Improvement in

credit conditions, with sharp reduction in interest rates; (2) upturn of bond prices and consequent increase in new bond issues; (3) expansion of construction work—now beginning; (4) stabilization of commodity prices—now appearing fairly imminent. But "these various constructive developments do not warrant the assumption of an excessively optimistic attitude."

Present rate of electric power output is regarded by National Industrial Conference Board as more nearly normal than last year's rate. This, the Board thinks, may indicate a return to more normal and perhaps saner conditions in industry and trade, but "anything more than a normal increase in business activity in the immediate future can hardly be expected."

Prices Becoming Stabilized

Calling attention to the fact that, during the past four weeks, price increases in Dun's list out-numbered declines in two weeks and were outnumbered in the other two, the Harvard Economic Society regards such fluctuating movements as "characteristic of a period when prices are stabilizing. When this period will terminate cannot be exactly known. But, with the prospect of expanding business activity, we expect it to be followed by a rise in our price indexes before the end of June."

Heavy Forgings of Nickel-Chromium-Molybdenum Steel

A CHRONOLOGICAL account of the development of molybdenum steel at Creusot, France, by Schneider & Cie., together with information on present day applications, is published in the January issue of *Aciers Spéciaux* (Paris). It is said that a satisfactory and forgeable ingot of molybdenum steel was first made by this company in June, 1894. Several other citations of dates during 1895-1898 are connected mainly with the manufacture of armor plate and forgings for naval and military material. In 1895, for instance, an ingot weighing 35 tons was poured from a Martin furnace and forged into armor plates 250 mm. thick—nearly 10 in.—which after hardening resisted ballistic tests satisfactorily.

In 1895 a 10-ton chromium-molybdenum ingot was made, cemented armor of this analysis in 1898, and in 1903 a nickel-chromium-molybdenum steel was found eminently suitable for hard and thick armor, oil quenched. Today these alloys are made to resist severe attacks of armor piercing shell and they occupy a very important position in the manufacture of both light and heavy ordnance.

Certain nickel-chromium-molybdenum steels have been found to possess a high magnetic permeability, and thus to be particularly suitable for field magnets for electrical machinery. Alternators of 35,000 to 50,000 kva. have been made at Creusot, and subjected to exacting tests for both

magnetic and mechanical properties. Recently a 31-ton rotor of this description was forged from an ingot weighing 48 tons. Tests showed no permanent elongation when heated to 250 deg. C. for 5 min, while subjected to a tensile strain of 60,000 lb. per sq. in. Hollow forgings for ammonia manufacture, weighing 34 tons each, have been forged on a mandril from 72-ton octagonal ingots.

In lighter work the Creusot firm has employed these alloys for railroad car trucks, shafts for traveling cranes, various parts of cannon, reducing gear for aeroplanes, torpedo tubes, for submarine parts and automobile parts, for steam hammers and such other uses as where the metal is to be subjected to fatigue, and where a high elastic limit and hardness are required without an increase in brittleness.

It is specially emphasized that the molybdenum is always used in conjunction with nickel, or with nickel and chromium. With tungsten and chromium the Creusot firm make high-speed tools and also non-scaling steel. Exact compositions are not given in the article.

Total mileage of the country's natural gas pipe lines is not so high as is commonly supposed, amounting to about 40,000 miles for the trunk lines and perhaps an equal amount for gathering lines, according to a report to the American Chemical Society by Dr. G. R. Hopkins of the Bureau of Mines.

Iron and Steel Markets

Prices Develop Further Weakness

Manufacturers' Wire, Reinforcing Bars and Merchant Bars
Decline—Pig Iron Off 50c. at Chicago—
Steel Output a Shade Lower

PRICE weakness in iron and steel has become more pronounced. Total steel ingot output shows no significant change, being at a 78 per cent rate compared with 80 per cent a week ago, but buying is at extremely short range, mill schedules in most finished products are irregular and interrupted, and pressure for tonnage to sustain operations is increasing.

Price instability extends to the primary materials. Scrap markets have grown still weaker, with heavy melting grade down 25c. a ton at Philadelphia and St. Louis. Chicago pig iron has receded 50c. a ton. Alabama foundry iron, which had been expected to react to the larger melt of cast pipe shops, has been sold in certain Northern sections at a new low price of \$12, Birmingham.

In view of the general weakness of the market, the Steel Corporation's announcement that it looks for a continuance of an 80 per cent rate of steel ingot production throughout the quarter is encouraging. In terms of tonnage, the rate of raw steel output for all producers has been higher in the first four months than the average for any previous year except 1928 and 1929. However, the percentage rate has been lower, because of expansion in capacity, and business has been unevenly distributed both geographically and in terms of products.

Mixed tendencies continue as the outstanding characteristic of the situation, although demand is shifting. Railroad demand is subsiding, while automotive requirements are creeping up and additional pipe line tonnage is being placed. Steel consumption by farm equipment manufacturers is undiminished, although the character of output has been altered, with haying and harvesting machinery now being turned out in place of tillage tools. Seasonal requirements for road making are promising, but spring buying of merchant wire products has been disappointing and demand for roofing sheets appears to have passed its peak. Structural steel awards, at 42,000 tons, are the largest since early in February.

A Central Western gas company has placed 725 miles of 22 and 24-in. seamless pipe, for a gas line from Texas to Minneapolis and St. Paul, with the National Tube Co. With lateral units, to be contracted for later, it will require 200,000 tons of steel.

Improvement in demand from the automobile industry, which is expected to continue through the com-

ing month, is limited to the makers of low-priced cars, no material change in the production schedules of other manufacturers being in prospect.

Rail mills are still operating at a good rate against backlogs accumulated during the winter, but railroad car builders are specifying more conservatively as they approach the time when additional orders will be required to sustain their operations. Outside of 2265 freight cars, on which the Illinois Central has taken figures, little new equipment business is in sight.

Price irregularities in finished steel range from occasional concessions to open breaks in the market. Reinforcing bars have declined \$2 a ton to 1.75c. a lb., Pittsburgh basis, and that price is also more common on merchant bars. Plates and shapes have also been shaded to 1.75c., although that price apparently has not displaced 1.80c. except on preferential business. Manufacturers' wire has receded to \$2.35 per 100 lb. at Chicago and to \$2.30 at Pittsburgh, or \$2 a ton below recent published quotations. Cold-rolled strip is being sold at as low as 2.45c. to tubing manufacturers, but 2.55c. is still being adhered to on most classes of business.

Exports of iron and steel for the first quarter amounted to 660,849 tons, or 143,000 tons less than in the corresponding period of 1929. There was a drop of 185,000 tons in rolled and finished steel but an increase of 46,000 tons in scrap exports. Imports also showed a slump, being 141,269 tons, or 24,415 tons under the imports a year ago.

Machinery exports made a new high record for the quarter, valued at close to \$170,000,000. The first three months of 1929 marked the previous peak, at \$155,800,000. In agricultural machinery Soviet Russia took 4½ times as much as it did in the same period last year.

Too much tin has forced spot Straits down to 34.37½c., New York, the lowest price since Oct. 13, 1922. Prime Western zinc, at 4.72½c., East St. Louis, is at the lowest level since April 15, 1922.

Both of THE IRON AGE composite prices have reached new lows for the year. Pig iron has declined from \$17.75 to \$17.67 a gross ton, and finished steel, from 2.264c. to 2.242c. a lb.

A Comparison of Prices

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron, Per Gross Ton:					Finished Steel,				
	Apr. 29, 1930	Apr. 22, 1930	Apr. 1, 1930	Apr. 30, 1929		Apr. 29, 1930	Apr. 22, 1930	Apr. 1, 1930	Apr. 30, 1929
No. 2 fdy., Philadelphia.....	\$20.26	\$20.26	\$20.26	\$21.76	<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
No. 2, Valley furnace.....	18.50	18.50	18.50	18.00	Sheets, black, No. 24, P'gh...	2.55	2.55	2.55	2.85
No. 2 Southern, Cin'ti.....	16.69	16.69	16.69	18.69	Sheets, black, No. 24, Chicago				
No. 2, Birmingham.....	14.00	14.00	14.00	15.00	dist. mill.....	2.65	2.65	2.65	3.05
No. 2 foundry, Chicago*.....	19.00	19.50	19.50	20.00	Sheets, galv., No. 24, P'gh...	3.30	3.30	3.30	3.60
Basic, del'd eastern Pa.....	18.75	18.75	19.00	20.25	Sheets, galv., No. 24, Chicago				
Basic, Valley furnace.....	18.50	18.50	18.50	18.00	dist. mill.....	3.40	3.40	3.40	3.80
Valley Bessemer, del'd P'gh..	20.76	20.76	20.76	20.26	Sheets, blue, No. 13, P'gh...	2.15	2.15	2.25	2.20
Malleable, Chicago*.....	19.00	19.50	19.50	20.00	Sheets, blue, No. 13, Chicago				
Malleable, Valley.....	19.00	19.00	19.00	18.50	dist. mill.....	2.25	2.25	2.35	2.40
L. S. charcoal, Chicago.....	27.04	27.04	27.04	27.04	Wire nails, Pittsburgh.....	2.15	2.15	2.20	2.65
Ferromanganese, furnace.....	94.00	94.00	94.00	105.00	Wire nails, Chicago dist. mill	2.20	2.25	2.35	2.70
					Plain wire, Pittsburgh.....	2.30	2.40	2.40	2.50
					Plain wire, Chicago dist. mill	2.35	2.45	2.45	2.55
					Barbed wire, galv., Pittsburgh	2.95	2.95	2.95	3.30
					Barbed wire, galv., Chicago				
					dist. mill.....	3.00	3.00	3.00	3.35
					Tin plate, 100 lb. box, P'gh...	\$5.25	\$5.25	\$5.25	\$5.35
Rails, Billets, Etc., Per Gross Ton:					Old Material, Per Gross Ton:				
Rails, heavy, at mill.....	\$43.00	\$43.00	\$43.00	\$43.00	Heavy melting steel, P'gh....	\$15.75	\$15.75	\$16.25	\$18.25
Light rails at mill.....	36.00	36.00	36.00	36.00	Heavy melting steel, Phila....	13.50	13.75	14.50	17.00
Rerolling billets, Pittsburgh..	33.00	33.00	33.00	36.00	Heavy melting steel, Ch'go....	13.00	13.00	13.00	15.75
Sheet bars, Pittsburgh.....	33.00	33.00	33.00	36.00	Carwheels, Chicago.....	14.25	14.50	14.50	14.50
Slabs, Pittsburgh.....	33.00	33.00	33.00	36.00	Carwheels, Philadelphia.....	15.00	15.00	15.00	16.50
Forging billets, Pittsburgh....	38.00	38.00	38.00	41.00	No. 1 cast, Pittsburgh.....	14.25	14.50	14.50	15.00
Wire rods, Pittsburgh.....	38.00	38.00	38.00	42.00	No. 1 cast, Philadelphia.....	15.00	15.00	15.00	16.50
	Cents	Cents	Cents	Cents	No. 1 cast, Ch'go (net ton)...	13.25	13.50	13.75	16.00
Skelp, grvd. steel, P'gh, lb....	1.85	1.85	1.85	1.85	No. 1 RR. wrot., Phila.....	15.00	15.00	15.00	16.00
					No. 1 RR. wrot., Ch'go (net)...	11.25	11.75	12.25	14.00
Finished Steel,					Coke, Connellsville,				
<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents	<i>Per Net Ton at Oven:</i>				
Bars, Pittsburgh.....	1.75	1.80	1.80	1.95	Furnace coke, prompt.....	\$2.60	\$2.60	\$2.60	\$2.75
Bars, Chicago.....	1.90	1.90	1.95	2.05	Foundry coke, prompt.....	3.50	3.50	3.50	3.75
Bars, Cleveland.....	1.80	1.80	1.85	1.95					
Bars, New York.....	2.09	2.14	2.14	2.29	Metals,				
Tank plates, Pittsburgh.....	1.80	1.80	1.80	1.95	<i>Per Lb. to Large Buyers:</i>	Cents	Cents	Cents	Cents
Tank plates, Chicago.....	1.90	1.90	1.90	2.05	Lake copper, New York.....	14.12 1/2	14.12 1/2	13.12 1/2	13.12 1/2
Tank plates, New York.....	2.02 1/2	2.02 1/2	2.07 1/2	2.22 1/2	Electrolytic copper, refinery..	13.75	13.75	17.75	17.75
Structural shapes, Pittsburgh..	1.80	1.80	1.80	1.95	Tin (Strait), New York.....	34.37 1/2	35.87 1/2	36.75	44.12 1/2
Structural shapes, Chicago....	1.90	1.90	1.90	2.05	Zinc, East St. Louis.....	4.72 1/2	4.75	4.82 1/2	6.60
Structural shapes, New York..	1.99 1/2	1.99 1/2	2.04 1/2	2.19 1/2	Zinc, New York.....	5.07 1/2	5.10	5.17 1/2	6.95
Cold-finished bars, Pittsburgh..	2.10	2.10	2.10	2.30	Lead, St. Louis.....	5.40	5.40	5.60	6.80
Hot-rolled strips, Pittsburgh..	1.70	1.70	1.70	1.90	Lead, New York.....	5.50	5.50	5.75	7.00
Cold-rolled strips, Pittsburgh..	2.55	2.55	2.55	2.75	Antimony (Asiatic), N. Y....	7.60	7.75	8.00	9.37 1/2

*The average switching charge for delivery to foundries in the Chicago district is 61c. per ton.

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of prices on various products, as shown in our market reports on other pages.

PITTSBURGH

Large Gas Line Award Features New Steel Business—Price Structure Unstable

PITTSBURGH, April 29.—Outstanding developments in the market this week have been of a favorable character, although not of a nature to stimulate the steel industry to increased activity.

A Central Western gas company has placed an order with a Pittsburgh producer for 725 miles of 22 and 24-in. seamless pipe for a line running from the Texas field to Minneapolis and St. Paul. With lateral units, this will require nearly 200,000 tons of steel and follows by only a few days the award of 450 miles to the same producer as the first unit of another large project originating in the same territory. A considerable portion of this tonnage is expected to be rolled in the Pittsburgh district, but work will naturally be extended over most of the remainder of the year.

Increasing activity in construction projects is also reported from nearly all sources, although little of this business has yet reached mills in the form of actual orders. Reports from the automobile industry are of a favorable nature, but tonnage releases for May rolling have by no means reached formidable volume except in the case of one or two manufacturers, who have maintained a fair rate all year.

Except for such exceptional developments as those mentioned above, local steel producers find business dull

for this season of the year. Mill schedules on nearly all products are irregular and interrupted, and the price structure is generally unstable because of the eagerness of many producers to maintain a steady operation at the expense of price. Buyers of steel find their usual policies seriously hindered by unsolicited offers of concessions, and this condition is probably one of the most important factors making for light demand. However, open breaks in the market are exceptional.

During the week wire and nail quo-

tations have been subject to additional pressure, following a long period of uncertainty, and concessions of \$2 a ton on cold-rolled strip have become more common. Bars, shapes and plates have declined generally to 1.80c., Pittsburgh, a quotation which has been frequent in large transactions since early in the year. Further concessions have appeared, but in the immediate Pittsburgh area no general decline in the present price level seems imminent.

Steel ingot operations in this and nearby district have not changed materially, although one company has lighted an additional blast furnace and another independent is expected to add several open-hearths next week. Finishing mill schedules vary sharply from week to week, and the average for the district in all departments is not above 75 per cent, with some estimates as low as 70. Open-hearth furnaces are running at 75 to 80 per cent, the higher figure being possible largely because of the well-

sustained schedules of two or three large companies. Rail mill operations are heavy, and tin plate schedules are well sustained in spite of sharp reductions at one or two points.

Pig Iron.—Sales have been negligible in the last week, and shipments continue light. Non-integrated steel companies have not increased their requirements to any marked extent this month, although more activity is expected at some points in May. Most of the orders being placed are for immediate shipment, as consumers are reluctant to commit themselves for the future at this time. A part of this hesitancy may be due to price uncertainty, although makers are still holding at the old schedules of \$18.50, Valley, for foundry and basic iron, and \$19 for malleable and Bessemer. The Pittsburgh furnace is quoting prices 50c. a ton higher. The Pittsburgh Crucible Steel Co. blew in its second stack last week.

Prices per gross ton, f.o.b. Valley furnace:
Basic\$18.50
Bessemer 19.00
Gray forge 18.00
No. 2 foundry 18.50
No. 3 foundry 18.00
Malleable 19.00
Low phos., copper free..... 27.00

Freight rate to Pittsburgh or Cleveland district, \$1.76.

Prices per gross ton, f.o.b. Pittsburgh district furnace:

Basic\$19.00
No. 2 foundry 19.00
No. 3 foundry 18.50
Malleable 19.50

Freight rates to points in Pittsburgh district range from 63c. to \$1.13.

Semi-Finished Steel.—No material changes in market conditions have appeared in the last week. Shipments to the smaller non-integrated steel companies have been slightly higher this month than last, but are still spotty and not well maintained, notably when going into sheet and strip production. The price is still nominally quotable at \$33, Pittsburgh, and even buyers who ordinarily get a preferential price on billets and sheet bars are now paying a figure which is based on the \$33 quotation.

Bars, Shapes and Plates.—April shipments will run approximately the same as in March, although a few makers report a slight decrease in plates. Demand for plates has failed

Steel price structure unstable.

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Scrap market shows further signs of weakness.

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Award of 725 miles of pipe for gas line features new business in steel.

* * *

Increased activity in construction projects, but orders are slow in reaching mills.

* * *

Open-hearth operations from 75 to 80 per cent, with finishing mills not above 75 per cent.

to show any seasonal improvement this year, and lighter releases from the car builders in the last few weeks have cut down operations at some mills. Failure of new car business to come out has forced shops to pursue a conservative buying policy, and most of them are anxious to make business now on their books last as long as possible. Barge yards are also taking very little steel, and some of the plants in this district have practically no work on hand. No new inquiry for barges has appeared, although a few lots are expected to come out before the end of the quarter.

Specifications for structural steel are improving steadily, and the volume of small awards is far ahead of last month. This has enabled smaller shops to improve their operations, and the larger interests have been able to take the desirable small orders to round out their schedules. Shape mills are running at a good rate, and present specifications are heavier than shipments.

Demand for merchant bars is sluggish, although reinforcing steel is moving much better. Pittsburgh mills are figuring on a number of large jobs which have been mentioned previously, and work on these projects is going ahead rapidly now that warmer weather is here.

Wire Products.—Shipments of man-

ufacturers' wire have fallen off and new buying is sharply restricted. This condition is prompted partly by the weak price situation on nails and other merchant wire products. Although mills continue to quote 2.40c., Pittsburgh, on bright hard wire, a 2.30c. quotation has appeared on considerable business and seems to be becoming a market factor.

The price of nails in this district seems hardly representative of the country at large, as \$2.20, Pittsburgh, is the ruling price on most of the business. Quotations considerably lower are made in other parts of the country, but \$2.15, Pittsburgh, seems to be the absolute minimum at which sales have been made in this territory. Nail prices are lower today than they have been at any time since the first quarter of 1916, and further declines seem imminent, unless the market gains considerable strength in the next few days. Shipments of nails and merchant wire products are very light, and new business is being sought strenuously by several makers.

Bolts, Nuts and Rivets.—Business this month has run slightly ahead of March, and the industry has been able to maintain an operating rate of about 60 per cent of capacity. Improvement in some forms of building activity has stimulated demand for rivets, and railroad business has been up to expectations with most companies. Prices are fairly well established, although weakness in the markets on raw materials going into bolt and nut manufacture is an unfavorable factor.

Sheets.—Specifications are holding at the slightly higher level which has prevailed in the last few weeks, but are still rather unequally distributed throughout the industry. Operations at different plants vary as much as 20 per cent from week to week, and few companies are able to schedule their sheet making capacity as far ahead as a week. Possible exceptions are makers of automobile body and steel furniture sheets, which have large backlog accounts and have been able to maintain steadier schedules. Steel furniture makers in general are well engaged.

The automotive industry continues to show improvement, but production

THE IRON AGE Composite Prices

Finished Steel

April 29, 1930, 2.242c. a Lb.

One week ago..... 2.264c.
One month ago..... 2.264c.
One year ago..... 2.412c.

Based on steel bars, beams, tank plates, wire, rails, black pipe and black sheets. These products make 87 per cent of the United States output of finished steel.

	High	Low
1930	2.362c., Jan. 7:	2.242c., April 29
1929	2.412c., April 2:	2.362c., Oct. 29
1928	2.391c., Dec. 11:	2.314c., Jan. 3
1927	2.453c., Jan. 4:	2.293c., Oct. 25
1926	2.453c., Jan. 5:	2.403c., May 18
1925	2.560c., Jan. 6:	2.396c., Aug. 18

Pig Iron

April 29, 1930, \$17.67 a Gross Ton

One week ago.....\$17.75
One month ago..... 17.75
One year ago..... 18.59

Based on average of basic iron at Valley furnace and foundry irons at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

	High	Low
1930	\$18.21, Jan. 7:	\$17.67, April 29
1929	18.71, May 14:	18.21, Dec. 17
1928	18.59, Nov. 27:	17.04, July 24
1927	19.71, Jan. 4:	17.54, Nov. 1
1926	21.54, Jan. 5:	19.46, July 13
1925	22.50, Jan. 13:	18.96, July 7

Mill Prices of Finished Iron and Steel Products

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.75c. to 1.80c.
F.o.b. Chicago	1.80c. to 2.00c.
Del'd Philadelphia	2.07c. to 2.12c.
Del'd New York	2.09c. to 2.14c.
F.o.b. Cleveland	1.80c.
F.o.b. Lackawanna	1.90c. to 1.95c.
F.o.b. Birmingham	2.00c.
C.I.F. Pacific ports	2.35c.
F.o.b. San Francisco mills	2.35c.

Billet Steel Reinforcing

F.o.b. P'gh mills, 40, 50, 60-ft.	1.75c. to 1.80c.
F.o.b. P'gh mills, cut lengths	2.00c. to 2.05c.
F.o.b. Birmingham, mill lengths	2.00c.

Rail Steel

F.o.b. mills, east of Chicago dist.	1.80c. to 1.90c.
F.o.b. Chicago Heights mill	1.80c.
Del'd Philadelphia	2.12c. to 2.22c.

Iron

Common iron, f.o.b. Chicago	1.90c. to 2.00c.
Refined iron, f.o.b. P'gh mills	2.75c.
Common iron, del'd Philadelphia	2.12c.
Common iron, del'd New York	2.14c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.80c.
F.o.b. Chicago	1.90c. to 1.95c.
F.o.b. Birmingham	2.00c.
Del'd Cleveland	1.94c. to 1.99c.
Del'd Philadelphia	1.95c. to 2.00c.
F.o.b. Coatesville	1.85c. to 1.90c.
F.o.b. Sparrows Point	1.90c. to 1.95c.
F.o.b. Lackawanna	1.90c. to 1.95c.
Del'd New York	2.02½c. to 2.07½c.
C.I.F. Pacific ports	2.20c.

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.80c.
F.o.b. Chicago	1.90c. to 1.95c.
F.o.b. Birmingham	2.00c.
F.o.b. Lackawanna	1.90c. to 1.95c.
F.o.b. Bethlehem	1.90c. to 1.95c.
Del'd Cleveland	1.94c. to 1.99c.
Del'd Philadelphia	1.81c. to 1.86c.
Del'd New York	1.94½c. to 2.04½c.
C.I.F. Pacific Ports	2.35c.

Hot-Rolled Hoops, Bands and Strips

	Base per Lb.
6 in. and narrower, P'gh	1.80c. to 1.90c.
Wider than 6 in., P'gh	1.70c. to 1.80c.
6 in. and narrower, Chicago	1.90c. to 2.00c.
Wider than 6 in., Chicago	1.80c. to 1.90c.
Cooperage stock, P'gh	2.10c. to 2.20c.
Cooperage stock, Chicago	2.30c.

Cold-Finished Steel

	Base per Lb.
Bars, f.o.b. Pittsburgh mill	2.10c.
Bars, f.o.b. Chicago	2.10c.
Bars, Cleveland	2.10c.
Bars, Buffalo	2.10c.
Shafting, ground, f.o.b. mill	2.45c. to 3.40c.
Strips, P'gh	2.45c. to 2.55c.
Strips, Cleveland	2.55c.
Strips, del'd Chicago	2.85c. to 2.95c.
Strips, Worcester	2.80c. to 2.90c.
Fender stock, No. 20 gage, Pittsburgh or Cleveland	3.90c.

*According to size.

Wire Products

(Carload lots, f.o.b. Pittsburgh and Cleveland.)
To Merchant Trade

	Base per Keg
Standard wire nails	\$2.15 to 2.30
Cement coated nails	2.20 to 2.30
Galvanized nails	4.10 to 4.30

	Base per Lb.
Polished staples	2.65c. to 2.75c.
Galvanized staples	2.90c. to 3.00c.
Barbed wire, galvanized	2.85c. to 2.95c.
Annealed fence wire	2.20c. to 2.30c.
Galvanized wire, No. 9	2.80c. to 2.90c.
Woven wire fence (per net ton to retailers)	\$65.00

To Manufacturing Trade

Bright hard wire, Nos. 6 to 9 gage	2.30c. to 2.40c.
Spring wire	3.50c.
(Carload lots, f.o.b. Chicago)	
Wire nails	\$2.20 to \$2.30 (keg)
Annealed fence wire	2.40c. to 2.50c. (lb.)
Bright hard wire to manufacturing trade	2.35c. to 2.45c.

Anderson, Ind., mill prices are ordinary \$1 a ton over Pittsburgh base; Duluth, Minn., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

Cut Nails

	Per 100 Lb.
Carloads, Wheeling, Reading or Northumberland, Pa.	\$2.55 to \$2.60
Less carloads, Wheeling or Reading	2.70

Light Plates

No. 10, blue annealed, f.o.b. P'gh	2.00c. to 2.10c.
No. 10, blue annealed, f.o.b. Chicago dist.	2.10c. to 2.20c.
No. 10, blue annealed, del'd Phila.	2.32c. to 2.42c.
No. 10, blue annealed, B'ham	2.25c. to 2.30c.

Sheets

Blue Annealed

	Base per Lb.
No. 13, f.o.b. P'gh	2.15c. to 2.25c.
No. 13, f.o.b. Chicago dist.	2.25c. to 2.35c.
No. 13, del'd Philadelphia	2.47c. to 2.57c.
No. 13, blue annealed, B'ham	2.40c. to 2.45c.

Continuous Mill Sheets

No. 10 gage, f.o.b. P'gh	1.80c. to 1.90c.
No. 13 gage, f.o.b. P'gh	1.95c. to 2.05c.

(Usual range 24 in. to 48 in. wide)

Box Annealed, One Pass Cold Rolled

No. 24, f.o.b. Pittsburgh	2.55c. to 2.65c.
No. 24, f.o.b. Chicago dist. mill	2.65c. to 2.75c.
No. 24, del'd Philadelphia	2.97c.
No. 24, f.o.b. Birmingham	2.80c.

Steel Furniture Sheets

No. 24, f.o.b. P'gh	3.80c. to 3.90c.
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Galvanized

No. 24, f.o.b. Pittsburgh	3.30c.
No. 24, f.o.b. Chicago dist. mill	3.40c.
No. 24, del'd Cleveland	3.49c.
No. 24, del'd Philadelphia	3.62c.
No. 24, f.o.b. Birmingham	3.45c.

Tin Mill Black Plate

No. 28, f.o.b. Pittsburgh	2.80c. to 2.90c.
No. 28, f.o.b. Chicago dist. mill	2.90c. to 3.00c.

Automobile Body Sheets

No. 20, f.o.b. Pittsburgh	3.80c.
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Long Ternes

No. 24, 8-lb. coating, f.o.b. mill	3.80c. to 3.90c.
Vitreous Enameling Stock	
No. 24, f.o.b. Pittsburgh	3.90c.

Tin Plate

	Per Base Box
Standard cokes, f.o.b. P'gh district mills	\$5.25
Standard cokes, f.o.b. Gary	5.35

Terne Plate

(F.o.b. Morgantown or Pittsburgh)

(Per Package, 20 x 28 in.)

8-lb. coating I.C. \$10.70	25-lb. coating I.C. \$15.90
15-lb. coating I.C. 13.40	30-lb. coating I.C. 16.80
20-lb. coating I.C. 14.60	40-lb. coating I.C. 18.80

Alloy Steel Bars

(F.o.b. makers mill)

Alloy Quantity Bar Base, 2.65c. per Lb.	Alloy Differential
S.A.E. Series Numbers	
2000 (½% Nickel)	\$0.25
2100 (1¼% Nickel)	0.55
2300 (3¼% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.15 to 0.25 Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.40 Molybdenum)	0.70
4600 Nickel Molybdenum (0.20 to 0.30 Molybdenum, 1.25 to 1.75 Nickel)	1.05
5100 Chromium Steel (0.60 to 0.90 Chromium)	0.35
5100 Chromium Steel (0.80 to 1.10 Chromium)	0.45
5100 Chromium Spring Steel	0.20
6100 Chromium Vanadium Bars	1.20
6100 Chromium Vanadium Spring Steel	0.95
9250 Silicon Manganese Spring Steel (flats)	0.25
Rounds and squares	0.50
Chromium Nickel Vanadium	1.50
Carbon Vanadium	0.95

Above prices are for hot rolled steel bars, forging quality. The differential for cold-drawn bars is ¼c. a lb. higher, with standard classification for cold-finished alloy steel bars applying. For billets 4 x 4 to 10 x 10 in., the price for a gross ton is the net price for bars of the same analysis.

Billets under 4 x 4 in. carry the steel bar base. Slabs with a sectional area of 16 in. or over carry the billet price. Slabs with sectional area of less than 16 in. or less than 2½ in. thick, regardless of sectional area, take the bar price.

Rails

	Per Gross Ton
Standard, f.o.b. mill	\$43.00
Light (from billets), f.o.b. mill	36.00
Light (from rail steel), f.o.b. mill	34.00
Light (from billets), f.o.b. Ch'go mill	36.00

Track Equipment

	Base per 100 Lb.
Spikes, ½ in. and larger	\$2.80
Spikes, ½ in. and smaller	2.80
Spikes, boat and barge	3.00
Tie plate, steel	2.07½

Angle bars	\$2.75
Track bolts, to steam railroads	\$3.80 to 4.00
Track bolts, to jobbers, all sizes, per 100 count	70 per cent off list

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills

Inches	Steel		Iron	
	Black	Galv.	Black	Galv.
¼	47	21½	¼ and ¾	+11 +36
½	53	27½	¾	23 6
¾	58	44½	1	28 11
1	62	50½	1 and 1½	31 15
1 to 3	64	52½	1½ and 2	35 18

Lap Weld

2	57	45½	2	23 9
2½ to 6	61	49½	2½ to 3½	28 13
7 and 8	58	45½	4 to 6	30 17
9 and 10	56	43½	7 and 8	29 16
11 and 12	55	42½	9 to 12	26 11

Butt Weld, extra strong, plain ends

¼	43	26½	¼ and ¾	+13 +48
½	49	32½	¾	23 7
¾	55	44½	1	28 12
1	60	49½	1 to 2	34 18
1 to 1½	62	51½		
2 to 3	63	52½		

Lap Weld, extra strong, plain ends

2	55	44½	2	29 13
2½ to 4	59	48½	2½ to 4	34 20
4½ to 6	58	47½	4½ to 6	33 19
7 to 8	54	41½	7 and 8	31 17
9 and 10	47	34½	9 to 12	21 8
11 and 12	46	33½		

On carloads the above discounts on steel pipe are increased on black by one point, with supplementary discount of 5%, and on galvanized by 1½ points, with supplementary discount of 5%. On iron pipe, both black and galvanized, the above discounts are increased to jobbers by one point with supplementary discounts of 5 and 2½%.

Note.—Chicago district mills have a base two points less than the above discounts. Chicago delivered base is 2½ points less. Freight is figured from Pittsburgh, Lorain, Ohio, and Chicago district mills, the billing being from the point producing the lowest price to destination.

Boiler Tubes

Base Discounts, f.o.b. Pittsburgh

Steel	Charcoal Iron
2 in. and 2½ in.	1½ in.
2½ in.—2½ in.	1¾ in.
3 in.—3½ in.	2 in.—2½ in.
3½ in.—3½ in.	2½ in.—2½ in.
4 in.	3 in.
4½ in. to 6 in.	3½ in. to 3½ in.
	4 in.
	4½ in.

On lots of a carload or more, the above base discounts are subject to a preferential of two fives on steel and of 10 per cent on charcoal iron tubes. Smaller quantities are subject to the following modifications from the base discounts:

Lap Welded Steel—Under 10,000 lb., 6 points under base and one five; 10,000 lb. to carload, 4 points under base and two fives. Charcoal Iron—Under 10,000 lb., 2 points under base; 10,000 lb. to carload, base and one five.

Standard Commercial Seamless Boiler Tubes

Cold Drawn

1 in.	61	3 in.	46
1½ to 1½ in.	53	3½ to 3½ in.	48
1¾ in.	37	4 in.	51
2 to 2½ in.	32	4½, 5 and 6 in.	40
2½ to 2½ in.	40		

Hot Rolled

2 and 2½ in.	38	3½ to 3½ in.	54
2½ and 2½ in.	46	4 in.	57
3 in.	52	4½, 5 and 6 in.	46

Beyond the above base discounts a preferential discount of 5 per cent is allowed on carload lots. On less than carloads to 10,000 lb., base discounts are reduced 4 points with 5 per cent preferential; on less than 10,000 lb., base discounts are reduced 6 points, with no preferential. No extra for lengths up to and including 24 ft. Sizes smaller than 1 in. and lighter than standard gages take the mechanical tube list and discounts. Intermediate sizes and gages not listed take price of next larger outside diameter and heavier gage.

Seamless Mechanical Tubing

	Per Cent Off List
Carbon, 0.10% to 0.30% base (carloads)	55
Carbon, 0.30% to 0.40% base	50
Plus differentials for lengths over 18 ft. and for commercial exact lengths. Warehouse discounts on small lots are less than the above.	

in May apparently will continue to be centered among a few large makers of low-priced cars. Metal lath makers are taking fair-sized tonnages, and manufacturers of other building materials are increasing their requirements slightly. Galvanized sheets are finding an increasing use in the ventilating systems of large office and industrial buildings, and this business is rather good at present. The farming industry is taking little galvanized material as yet, but demand from this source is expected to pick up after crop planting is out of the way. Sheet mills are running at 70 to 75 per cent of capacity in this and nearby districts.

Prices lack strength, but have not changed materially in the last week. On most products a \$2 price range is necessary to represent the market correctly, although automobile body sheets are quotable at 3.80c., and the 3.30c., Pittsburgh, price on galvanized sheets is representative of the market except in the case of large jobber business in the East, where concessions of \$1 a ton have been made.

Tin Plate.—Reports from the tin plate industry are mixed, and even though a few large independents report very high operations, the average for the industry is not above 90 per cent of capacity and probably not much above 85 per cent. The leading interest is still running between 80 and 85 per cent, and, even though one maker has been scheduled at 18 and even 19 turns, another curtailed its production sharply last week. June specifications are heavy, but the container manufacturers have large stocks of raw materials and are not yet beginning to move their product to the canners in heavy volume. Occasional reports of frost in the fruit areas have been heard, but the pack in California promises to be large and there has been nothing to indicate any reduction in the vegetable pack.

Strip Steel.—Demand for hot-rolled material is fairly good, and the operating schedules of several mills are running between 80 and 90 per cent of capacity. This is the best rate reached thus far this year, although at the same time last year deliveries were difficult to get in less than six weeks. The automobile industry is responsible for part of the increased strip business, but general demand seems to be a shade stronger, and prices are being generally maintained at 1.70c., Pittsburgh, for material wider than 6 in. and 1.80c. for the narrower widths.

On cold-rolled strip, the picture is entirely different, with demand unusually light and a mill schedule of more than 50 per cent exceptional. Competition for business is keen, and prices are unsettled. Tubing manufacturers are not paying more than 2.45c., Pittsburgh or Cleveland, and this price has become more common on other desirable tonnage. Makers continue to quote 2.55c. to the trade in general.

Cold-Finished Steel Bars.—Specifi-

Warehouse Prices, f.o.b. Pittsburgh

*Base per Lb.

Plates	3.00c.
Structural shapes	3.00c.
Soft steel bars and small shapes	2.90c.
Reinforcing steel bars	2.90c.
Cold-finished and screw stock—	
Rounds and hexagons	3.60c.
Squares and flats	4.10c.
Bands	3.25c.
Hoops	4.25c.
Black sheets (No. 24), 25 or more bundles	3.60c.
Galv. sheets (No. 24), 25 or more bundles	4.25c.
Light plates, blue annealed (No. 10), 1 to 24 plates	3.20c.
Blue annealed sheets (No. 13)	3.25c.
Galv. corrug. sheets (No. 28), per square	4.13c.
Spikes, large	3.40c.
Small	3.80c. to 5.25c.
Boat	3.80c.
Track bolts, all sizes, per 100 count, 60 per cent off list	
Machine bolts, 100 count, 60 per cent off list	
Carriage bolts, 100 count, 60 per cent off list	
Nuts, all styles, 100 count, 60 per cent off list	
Large rivets, base per 100 lb.	\$3.50
Wire, black, soft ann'l'd, base per 100 lb.	\$2.75 to 2.85
Wire, galv. soft, base per 100 lb.	3.20 to 3.30
Common wire nails, per keg	2.60 to 2.75
Cement coated nails, per keg	2.65 to 2.80

*On plates, structurals, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applies to orders of 400 to 3999 lb.

cations are coming in at about the rate which has prevailed for the greater part of the month, and April business will average 5 to 10 per cent ahead of that of March. With some companies shipments have shown a larger gain, principally because of more liberal releases from the automobile industry. Demand in general is more diversified than it was earlier in the year. The price is holding at 2.10c., Pittsburgh, except in the case of large buyers in the Detroit territory, who ordinarily enjoy a slight preferential.

Coal and Coke.—The coke market has not improved, and producers are still making efforts to hold the price on the furnace grade at \$2.60, Connellsville. Sales in the East have been made at \$2.50, but large producers are not quoting this price generally. Foundry coke is also quiet, and shipments this month have not improved over those of March. Coal prices are still hitting new lows, and the delayed opening of the Lake business has depressed the market further. Slack is still scarce and prices strong.

Tubular Products.—The Missouri-Kansas Pipe Line Co. has placed orders for 375 miles of 24-in. and 350 miles of 22-in. seamless pipe with the Steel Corporation subsidiary. This is for a gas line extending from the Texas Panhandle to the Minnesota Twin Cities, and, with feeder lines to be placed later, will call for nearly 200,000 tons. Although seamless material is to be used principally on the line, it is likely that electric welded pipe soon to be made by the National Tube Co. at Christy Park, Pa., will make up part of the tonnage. This is the second pipe line order placed with the National Tube Co. in the last few days, announcement having been

made last week of the award of 450 miles of seamless pipe as the initial unit of a line running from Amarillo, Tex., to the Chicago district, which is to be built by the Doherty interests. Although the company has seamless capacity at Gary, Ind., and Lorain, Ohio, it is expected that a considerable part of this tonnage will be turned out in the new mill at McKeesport, Pa., which probably will get into production in the summer.

The introduction of the electric welding process in pipe manufacture and the heavy increase in seamless capacity are replacing lapweld pipe in many lines, partly accounting for the very low rate of lapweld production in the district just now. Standard building pipe this month is more active than in March, but is still below normal, while oil country goods are falling considerably behind the corresponding period last year.

Old Material.—The scrap market has been quieter than usual, with practically no mill buying reported and hold-ups in effect at a few points. Dealers' orders are beginning to run out at several mills, and some buying is expected early in the new month. With prices rather soft, it is difficult to project the trend of the next few weeks, but good scrap is not plentiful and sales made recently at low figures are not yet easy to cover. Some No. 1 heavy melting is available to dealers at \$15.50 and \$15.25, while hydraulic compressed sheets are being sold in Detroit at a figure approximating the last reported sale here, which was at \$15.75. Specialties are quiet and shipments light on account of declining activity in steel foundries. Machine shop turnings are rather weak, with a hold-up in effect at one of the principal consuming points.

Prices per gross ton delivered consumers' yards in Pittsburgh and points taking the Pittsburgh district freight rate:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel	\$15.50 to \$16.00
No. 2 heavy melting steel	13.50 to 14.00
Scrap rails	14.50 to 15.00
Compressed sheet steel	15.50 to 15.75
Bundled sheets, sides and ends	13.50 to 14.00
Cast iron car wheels	14.00 to 14.50
Sheet bar crops, ordinary	17.00 to 17.50
Heavy breakable cast	11.50 to 12.00
No. 2 railroad wrought	15.50 to 16.00
Hvy. steel axle turnings	14.00 to 14.50
Machine shop turnings	11.00 to 11.50
Acid Open-Hearth Grades:	
Railr. knuckles and couplers	19.00 to 19.50
Railr. coil and leaf springs	19.00 to 19.50
Rolled steel wheels	19.00 to 19.50
Low phos. billet and bloom ends	21.00 to 22.00
Low phos. mill plates	20.00 to 21.00
Low phos. light grades	20.00 to 21.00
Low phos. sheet bar crops	20.50 to 21.50
Heavy steel axle turnings	14.00 to 14.50
Electric Furnace Grades:	
Low phos. punchings	19.00 to 19.50
Heavy steel axle turnings	14.00 to 14.50
Blast Furnace Grades:	
Short shoveling steel turnings	10.50 to 11.00
Short mixed borings and turnings	10.50 to 11.00
Cast iron borings	10.50 to 11.00
Rolling Mill Grades:	
Steel car axles	21.50 to 22.50
Cupola Grades:	
No. 1 cast	14.00 to 14.50
Rails 3 ft. and under	18.50 to 19.00

Semi-Finished Steel, Raw Materials, Bolts and Rivets

Mill Prices of Semi-Finished Steel

Billets and Blooms		Sheet Bars		Skelp	
Per Gross Ton		(Open Hearth or Bessemer)		(F.o.b. Pittsburgh or Youngstown)	
Rerolling, 4-in. and under 10-in. Pitts-		Pittsburgh	Per Gross Ton	Grooved	Per Lb.
burgh	\$33.00	Youngstown	\$33.00	Universal	1.85c. to 1.90c.
Rerolling, 4-in. and under 10-in., Youngs-		Cleveland	33.00	Sheared	1.85c. to 1.90c.
town	33.00				
Rerolling, 4-in. and under 10-in., Cleveland	33.00	Slabs		Wire Rods	
Rerolling, 4-in. and under 10-in., Chicago	34.00	(8 in. x 2 in. and under 10 in. x 10 in.)		(Common soft, base)	
Forging quality, Pittsburgh	38.00	Pittsburgh	Per Gross Ton	Pittsburgh	Per Gross Ton
		Youngstown	\$33.00	Cleveland	\$33.00
		Cleveland	33.00	Chicago	39.00

Prices of Raw Material

Ores		Ferromanganese		Fluxes and Refractories	
Lake Superior Ores, Delivered Lower Lake Ports		Per Gross Ton		Fluorspar	
Old range Bessemer, 51.50% iron	\$4.80	Domestic, 80%, seaboard	\$94.00 to \$99.00	Domestic, 85% and over calcium fluoride, not over 5% silicon, gravel, f.o.b. Illinois and Kentucky mines	\$18.00
Old range non-Bessemer, 51.50% iron	4.65	Foreign, 80%, Atlantic or Gulf port, duty paid	94.00 to 99.00	No. 2 lump, Illinois and Kentucky mines	20.00
Mesabi Bessemer, 51.50% iron	4.65	Spiegeleisen		Foreign, 85% calcium fluoride, not over 5% silica, c.i.f. Atlantic port, duty paid	\$18.00 to 18.50
Mesabi non-Bessemer, 51.50% iron	4.50	Per Gross Ton Furnace		Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2 1/2% silica, f.o.b. Illinois and Kentucky mines	32.50
High phosphorus, 51.50% iron	4.40	Domestic, 19 to 21%	\$31.00 to \$34.00		
Foreign Ore, c.i.f. Philadelphia or Baltimore		Domestic, 16 to 19%	29.00 to 32.00	Fire Clay Brick	
Iron ore, low phos., copper free, 55 to 58% iron in dry Spanish or Algerian	\$12.00c.	Electric Ferrosilicon		Per 1000 f.o.b. Works	
Iron ore, low phos., Swedish, average 68% iron	12.00c.	Per Gross Ton Delivered		High-Heat	Intermediate
Iron ore, basic Swedish, average 65% iron	10.00c.	50%	\$83.50	Duty Brick	Heavy Duty Brick
Manganese ore, washed 52% manganese, from the Caucasus	30.00c.	75%	130.00	Pennsylvania	\$43.00 to \$46.00
Manganese ore, Brazilian, African or Indian, basic 50%	30.00c.	Per Gross Ton Furnace		Maryland	43.00 to 46.00
Tungsten ore, high grade, per unit, in 60% concentrates	\$14.00 to \$16.50	10%	\$35.00	New Jersey	50.00 to 65.00
Chrome ore, 45 to 50% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$22.00 to \$24.00	11%	37.00	Ohio	43.00 to 46.00
Molybdenum ore, 85% concentrates of MoS ₂ , delivered	50c. to 55c.	Bessemer Ferrosilicon		Kentucky	43.00 to 46.00
		F.o.b. Jackson County, Ohio, Furnace		Missouri	43.00 to 46.00
		Per Gross Ton		Illinois	43.00 to 46.00
		10%	\$30.00	Ground fire clay, per ton	7.00
		11%	32.00		
		Silvery Iron		Silica Brick	
		F.o.b. Jackson County, Ohio, Furnace		Per 1000 f.o.b. Works	
		Per Gross Ton		Pennsylvania	\$43.00
		6%	\$22.00 to \$23.00	Chicago	52.00
		7%	23.00 to 24.00	Birmingham	50.00
		8%	24.00 to 25.00	Silica clay, per ton	\$8.50 to 10.00
		9%	25.00 to 26.00		
		Other Ferroalloys		Magnesite Brick	
		Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr. delivered, in carloads		Per Net Ton	
		11.00c.		Standard sizes, f.o.b. Baltimore and Chester, Pa.	\$65.00
		Ferrovanadium, per lb. contained vanadium, f.o.b. furnace		Grain magnesite, f.o.b. Baltimore and Chester, Pa.	40.00
		\$3.15 to \$3.65		Standard size	45.00
		Ferrocobalt, 15 to 18%, per net ton, f.o.b. furnace, in carloads			
		\$160.00		Chrome Brick	
		Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base, per gross ton		Per Net Ton	
		\$91.00		Standard size	\$45.00
		Ferrophosphorus, electric 24%, f.o.b. An-niston, Ala., per gross ton			
		\$122.50			

Mill Prices of Bolts, Nuts, Rivets and Set Screws

Bolts and Nuts		Bolts and Nuts		Small Rivets	
Per 100 Pieces		Per Cent Off List		(7/8-in. and smaller)	
(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)		Semi-finished hexagon nuts	70	Per Cent Off List	
†Machine bolts	70	Semi-finished hexagon castellated nuts, S.A.E.	70	F.o.b. Pittsburgh	70 and 10
†Carriage bolts	70	Stove bolts in packages, P'gh.	75, 20, 10 and 5	F.o.b. Cleveland	70 and 10
Lag bolts	70	Stove bolts in packages, Chicago	75, 20, 10 and 5	F.o.b. Chicago	70 and 10
Plow bolts, Nos. 1, 2, 3 and 7 heads	70	Stove bolts in packages, Cleveland	75, 20, 10 and 5	Cap and Set Screws	
Hot-pressed nuts, blank or tapped, square	70	Stove bolts in bulk, P'gh.	75, 20, 10, 5 and 2 1/2	(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)	
Hot-pressed nuts, blank or tapped, hexagons	70	Stove bolts in bulk, Chicago	75, 20, 10, 5 and 2 1/2	Per Cent Off List	
C.p.c. and t. square or hex. nuts, blank or tapped	70	Stove bolts in bulk, Cleveland	75, 20, 10, 5 and 2 1/2	Milled cap screws	80, 10 and 5
Washers*	7.00c. to 6.75c. per lb. off list	Tire bolts	60, 5 and 5	Milled standard set screws, case hardened	80 and 5
		Discounts of 70 per cent off on bolts and nuts applied on carload business. For less than carload orders discounts of 55, 60 per cent apply.		Milled headless set screws, cut thread	75 and 10
		Large Rivets		Upset hex. head cap screws, U.S.S. thread	85 and 10
		(1/4-in. and larger)		Upset set screws, S.A.E. thread	85 and 10
		Base per 100 Lb.		Milled studs	70
		F.o.b. Pittsburgh or Cleveland	\$3.10		
		F.o.b. Chicago	3.20		

*F.o.b. Chicago, New York and Pittsburgh.
†Bolts with rolled thread up to and including 1/4 in. x 6 in. take 10 per cent lower list prices.

CHICAGO

Pig Iron Reduced 50c. a Ton—Steel Price Situation Uncertain—Operations Taper

CHICAGO, April 29.—Although the Western iron and steel market shows little change when taken as a whole, there are more uncertain factors existing today than a week ago.

The leading producer continues to operate 18 blast furnaces, and shipments of most heavy tonnage products are well maintained. However, the use of sheet bars is lighter than at the middle of the month and in at least one instance steel mill pig iron is being piled. Therefore, it seems that a fair estimate of ingot production is somewhere in the range of 90 to 95 per cent of capacity, which is a shade below the rate a week ago.

Current specifications for plates, shapes and bars are at the average of the first three weeks in April, and sales are in fair volume. It is the price structure that is giving great concern to buyers and sellers alike.

New orders are at extremely close range, and resistance to prices becomes more severe each day. Concessions are more common than a week ago, and it appears that anyone who ever occupied a place as a preferred buyer has again been taken into the circle. Prices for wire products may undergo a change on short notice, and quotations on Northern pig iron are off 50c. a ton, while differentials on Southern iron are not holding.

On the brighter side of the market is a revival of interest in building construction. Orders from oil and gas producers also loom large, and include contracts for 3200 tons of plates for tank construction and 725 miles of 22 and 24-in. steel pipe placed by the Missouri-Kansas Pipe Line Co. with the National Tube Co. Shipments of steel in April are fully equal to the total in March.

Pig Iron.—Chicago producers of Northern pig iron are announcing price reductions of 50c. a ton, making the f.o.b. furnace price \$19 for the base grade. This downward revision seems to be a step to meet competition, rather than an effort to stimulate the market, which from all outward appearances is readily absorbing the make of all of the local merchant stacks, excepting one that is out for relining. This furnace may be blown in soon after the first of the month.

A buyer in southern Wisconsin is in the market for 2000 tons for delivery in May. A user of Southern iron at Joliet has ordered 300 tons at \$13 a gross ton, Birmingham, for the base grade, or \$19.01 a ton, delivered. Differentials were shaded on this order. It is reported that a cargo of Lake Erie iron is on its way to Chicago docks.

Prices per gross ton at Chicago:

N'th'n No. 2 fdy., sil. 1.75 to 2.25	\$19.00
N'th'n No. 1 fdy., sil. 2.25 to 2.75	19.50
Malleable, not over 2.25 sil.	19.00
High phosphorus	19.00
Lake Super. char'cl, sil. 1.50	27.04
S'th'n No. 2 fdy.	\$18.20 to 19.01
Low phos., sil. 1 to 2, copper free	29.50
Silvery, sil. 8 per cent.	\$28.79 to 29.79
Bess. ferrosilicon, 14-15 per cent.	46.29

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnace, not including an average switching charge of 61c. per gross ton.

Ferroalloys.—Delivery of a cargo of English spiegeleisen is expected at Chicago some time in the early part of May. New business in ferroalloys is spotty and most of it is in less than carload lots.

Coke.—The Chicago by-product foundry coke market is steady both as to prices and rate of shipments.

Bars.—Demand for bars is steady from most of the consuming industries in this district. Specifications in April closely match the total in March, and releases at hand are in satisfactory volume. Shipments are heavier to makers of low-priced automobiles, while deliveries to builders of medium and high-priced automobiles show very slight improvement. Deliveries of bars to manufacturers of tractors and harvesting machinery remain heavy, and shipping instructions indicate a sustained rate of consumption. Prices for mild steel bars are steady at 1.90c. a lb., Chicago, with occasional small lots being taken at 2c.

Slight growth is noted in specifications for alloy steel bars for use by

automobile manufacturers. Other consumers are taking this commodity at close range, but in relatively steady aggregate volume.

The iron bar market is dull in proportion to demand for other bar mill products and is giving further evidence of the dwindling use of this commodity.

Demand for rail steel bars by the manufacturing trade continues light, though somewhat heavier than a week ago. Barn equipment manufacturers are finding the season a slow one, but they consider that the outlook for the near future is favorable. There is some evidence that the bed trade is enjoying better business.

Wire Products.—Prices in this market still lack stability, although variations now are not as wide as in the past two weeks. Common wire nails are now quoted at \$2.20 a keg, Chicago, to jobbers in carload lots. Manufacturers' wire, has declined, the range now being 2.35c. to 2.45c. a lb. Specifications from the manufacturing trade show improvement in volume, but the change has not been sharp enough to offset the drop in demand from jobbers. Country trade is suffering from unseasonable weather and the fact that farmers are now paying more attention to field work than to maintenance and construction. Mill operations are unchanged, and stocks in the hands of producers are expanding in some directions.

Rails and Track Supplies.—Purchases of standard-section rails in the past week totaled about 1000 tons. Much of this was taken by frog and switch manufacturers. Operations of local rail mills continue at near capacity. Miscellaneous orders for track supplies aggregate 800 tons. New inquiries are not impressive. The light rail market demand is confined to a few small lots.

Prices f.o.b. mill, per gross ton: Standard section open-hearth and Bess. rails, \$43; light rails, rolled from billets, \$36. Per lb.: Standard railroad spikes, 2.80c.; track bolts with square nuts, 3.80c.; steel tie plates, 2.07½c. to 2.15c.; angle bars, 2.75c.

Plates.—New plate business in the week has been widely scattered, but in the aggregate is satisfying to local mills. The sheared product is still well in the lead, and mills making this commodity have comfortable schedules. New orders and specifications from railroads for building cars in their own shops, for current car repair programs and for bridge maintenance work are close to normal for this time of the year. Engagement of local plate mills is heavier than at the beginning of the month because of demand for shipment for the manufac-

Warehouse Prices, f.o.b. Chicago

	Base per Lb.
Plates and structural shapes	3.10c.
Soft steel bars	3.00c.
Reinforc'g bars, billet steel—	
Under 5 tons	2.85c.
5 tons to 30 tons	2.45c.
30 tons and over	2.00c.
Rail steel reinforcement	1.75c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons	3.60c.
Flats and squares	4.10c.
Bands (¾ in. in Nos. 10 and 12 gages)	3.20c.
Hoops (No. 14 gage and lighter)	3.75c.
Black sheets (No. 24)	4.05c.
Galv. sheets (No. 24)	4.60c.
Blue ann'l'd sheets (No. 10)	3.35c.
Spikes, ¾ in. and larger	3.55c.
Track bolts	4.55c.
Rivets, structural	4.00c.
Rivets, boiler	4.00c.
	Per Cent Off List
Machine bolts	60
Carriage bolts	60
Coach or lag screws	60
Hot-pressed nuts, sq., tap. or blank	60
Hot-pressed nuts, hex., tap. or blank	60
No. 8 black ann'l'd wire, per 100 lb.	\$3.45
Com. wire nails, base per keg	\$2.75 to 2.85
Cement c't'd nails, base per keg	2.75 to 2.85

ture of electrically welded pipe. On this score, there seems to be little doubt that deliveries this month will exceed shipments in March. Promises of delivery now range from two to six weeks.

Specifications from car shops, though lighter than several weeks ago, are still in satisfactory volume when it is considered that new car business is spotty and small and that car builders are approaching the time when new business must be had in order to sustain current rate of operations. The Illinois Central has issued its expected inquiry for 2265 freight cars. A Western railroad has ordered three locomotives, another will buy 15 engines.

An oil refiner in the Southwest has ordered 1000 tons of plates for storage tank construction. Fresh inquiries for such work are lacking in this market, but old requests for prices, which aggregate fully 15,000 tons, are still considered alive by the local trade.

Quotations at Chicago are steady at 1.90c. a lb. Occasionally 1.95c. is done on less desirable business, but the 2c. quotation has practically disappeared.

Structural Material.—This week is outstanding in new orders and fresh inquiries. Awards total 7500 tons, including 4100 tons for an addition to the Morrison Hotel, Chicago. Fresh inquiries call for not less than 15,000 tons, and it is conservatively estimated that not less than 35,000 tons is now pending in the Middle West.

The Lane Technical High School, Chicago, calls for 5000 tons, and the Chicago & North Western will use 3600 tons in its 1930 bridge program. Public utilities continue to take bids for new power plant construction. Highway bridges and railroad bridges are playing an important part in this market.

The bulk of the tonnage moving is at 1.90c., Chicago, the 2c. quotation having virtually disappeared.

Cast Iron Pipe.—This market is failing to hold the gains made earlier in the month. Fresh inquiries are not as promising as they were, and new business is a distinct disappointment to sellers, who had expected an active market in April and May.

Ohio City, Ohio, has ordered 24,000 ft. of 4 to 8-in. pipe from the McWane Cast Iron Pipe Co. Chicago will open bids May 7 on 1450 tons of 6 to 12-in. pipe, and Hammond, Ind., will take figures on the same date on an unstated tonnage of 4 to 16-in. Class D pipe. Cygnet, Ohio, is in the market for 150 tons of 4 to 8-in. pipe.

Prices per net ton, deliv'd Chicago: Water pipe, 6-in. and over, \$45.20 to \$46.20; 4-in., \$48.20 to \$49.20; Class A and gas pipe, \$3 extra.

Bolts, Nuts and Rivets.—April shipments are about equal to deliveries in March. In the past few days there has been improvement in specifications from automobile manufacturers. Although a change has occurred in the character of demand from the farm implement trade, this having been

brought about by the transition from production of tillage machinery to haying and harvesting machinery, the aggregate tonnage taken by this class of buyers has varied little in recent weeks.

Reinforcing Bars.—Conditions in the building industry are the most promising so far this year. More large tonnage reinforced concrete steel projects have come before the trade this week,

Pig iron prices reduced 50c. a ton.

* * *

Steel price situation uncertain.

* * *

Scrap prices yield to further weakness.

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Structural steel awards and inquiries larger. Plate tonnage one of chief supports of Chicago mill operations.

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Illinois Central issues inquiry for 2265 freight cars.

* * *

Pipe line order takes 725 miles of 22 and 24-in. pipe.

and bar tonnages being shipped for road work are impressive. Of outstanding interest is the fact that two large apartment buildings are up for figures. Also encouraging is the fact that the Chicago park commissioners are taking figures on the outer drive development on which about \$15,000,000 will be spent. Although the price situation shows improvement, it still lacks stability. Rail steel reinforcing bars are being quoted 1.80c. a lb. Chicago, for road and bridge work.

Sheets.—Operations at local hot mills are slightly improved, but the character of business is such that schedules are being arranged at extremely close range, and operations are generally unsatisfactory. Sheet production now stands between 70 and 75 per cent of capacity.

The demand for roofing sheets, which normally tapers sharply about May 15, is already at a low point and, in view of unseasonable weather and work now necessary in the fields, it is doubtful if an upturn can be expected again this season.

Most new orders are small and pressure for prompt delivery is insistent, thereby giving strength to the assertions of sellers that stocks in the hands of users are unusually small. Use of sheets by farm implement manufacturers is steady and in good volume.

Base prices per lb., deliv'd from mill in Chicago: No. 24 black sheets, 2.70c. to 2.80c.; No. 24 galv., 3.45c.; No. 10 blue ann'd, 2.25c. Deliv'd prices at other Western points are equal to the freight from Gary, plus the mill prices, which are 5c. per 100 lb. lower than Chicago delivered prices.

Old Material.—Recent sales of heavy melting steel have established prices at \$13 to \$13.50 a gross ton, but this structure is not stable and there are some in the trade who believe that quotations will go lower. Incoming shipments are seasonally large, while consumption is probably a shade lighter than at the middle of the month. Shipments of this grade to mills remain heavy, and it is quite likely that accumulations in mill yards are growing.

Small users of scrap are using great caution in making commitments. Orders are usually for nearby requirements, and pressure for prompt delivery is insistent. The Santa Fe, which usually gets top prices for its offerings, has recently sold a tonnage of short rails at \$15.25 a gross ton on track.

The supply of hydraulic bundles is none too large for current consumption, and prices for this grade are steady. The cast iron boring market is quiet except for shipments against old orders.

Prices deliv'd Chicago district consumers. Per Gross Ton

Basic Open-Hearth Grades:	
Heavy melting steel.....	\$13.00 to \$13.50
Shoveling steel	13.00 to 13.50
Frogs, switches and guards, cut apart, and misc. rails	13.75 to 14.25
Hydraul. compressed sheets	11.75 to 12.25
Drop forge flashings.....	9.75 to 10.25
No. 1 busheling	11.00 to 11.50
Forg'd cast and r'l'd steel carwheels	15.50 to 16.00
Railroad tires, charg. box size	16.00 to 16.50
Railroad leaf springs cut apart	16.50 to 17.00
Acid Open-Hearth Grades:	
Steel couplers and knuckles	14.50 to 15.00
Coil springs	17.00 to 17.50
Electric Furnace Grades:	
Axle turnings	12.00 to 12.50
Low phos. punchings.....	14.00 to 14.50
Low phos. plates, 12 in. and under	14.00 to 14.50
Blast Furnace Grades:	
Axle turnings	10.50 to 11.00
Cast iron borings	9.25 to 9.75
Short shoveling turnings..	9.25 to 9.75
Machine shop turnings....	7.25 to 7.75
Rolling Mill Grades:	
Iron rails	14.00 to 14.50
Rerolling rails	15.00 to 15.50
Cupola Grades:	
Steel rails, less than 3 ft..	15.25 to 15.75
Steel rails, less than 2 ft..	15.75 to 16.25
Angle bars, steel.....	14.50 to 15.00
Cast iron carwheels	14.25 to 14.75
Malleable Grades:	
Railroad	16.00 to 16.50
Agricultural	15.00 to 15.50
Miscellaneous:	
*Relaying rails, 56 to 60 lb.	23.00 to 25.00
*Relaying rails, 65 lb. and heav.	26.00 to 31.00

Per Net Ton	
Rolling Mill Grades:	
Iron angle and splice bars	14.00 to 14.50
Iron arch bars and transoms	15.50 to 16.00
Iron car axles	25.00 to 25.50
Steel car axles	16.00 to 16.50
No. 1 railroad wrought....	11.25 to 11.75
No. 2 railroad wrought....	11.50 to 12.00
No. 1 busheling	9.00 to 9.50
No. 2 busheling	7.25 to 7.75
Locomotive tires, smooth..	14.50 to 15.00
Pipes and flues	8.50 to 9.00
Cupola Grades:	
No. 1 machinery cast.....	13.25 to 13.75
No. 1 railroad cast	12.75 to 13.25
No. 1 agricultural cast....	11.00 to 11.50
Stove plate	10.00 to 10.50
Grate bars	10.25 to 10.75
Brake shoes	10.00 to 10.50

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

NEW YORK

Pig Iron Sales of 9000 Tons— Steel Volume Not Gaining

NEW YORK, April 29.—Pig iron sales, mainly made up of small lots, totaled 9000 tons, compared with 10,000 tons in the previous week. The Foran Foundry & Mfg. Co., Flemington, N. J., is in the market for 1500 tons of foundry iron, and the General Electric Co. is inquiring for 450 tons for delivery at Bayway, N. J. Otherwise current inquiries are principally for unimportant tonnages. Shipments keep up at about the same rate as heretofore, indicating no improvement in melt.

A cargo of 3000 tons of Dutch iron is expected to arrive at Bridgeport, Conn., next week. Royal Dutch No. 1X is quoted at \$22.75 a ton, duty paid, port of entry.

Prices of domestic irons are substantially unchanged. Buffalo foundry iron is still available at \$16, base furnace, and Alabama iron is offered at \$18.50, delivered alongside in New York harbor, with \$18 regarded as possible on attractive lots. The latter figure is equivalent to \$12.50, Birmingham. In the Chicago district delivered prices are being quoted that figure back to \$12, Birmingham.

Prices per gross ton, delivered New York district:

Buffalo No. 2 fdy., sil.	1.75
to 2.25	\$20.91 to \$21.41
*Buff. No. 2, del'd east.	
N. J.	19.28 to 19.78
East. Pa. No. 2 fdy., sil.	
1.75 to 2.25	19.39 to 21.02
East. Pa. No. 2X fdy., sil.	
2.25 to 2.75	19.89 to 21.52

Freight rates: \$4.91 from Buffalo, \$1.39 to \$2.52 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.28 a ton from Buffalo.

Reinforcing Bars.—Considerable tonnage is being figured on, but price weakness has deterred the placing of some business. A decline in the mill price to 1.75c., Pittsburgh, may have a stabilizing influence. Warehouse quotations are as yet unchanged. Lettings are featured by road construction work, the outstanding award being 1500 tons for the West Street elevation in this city, divided equally between two dealers.

Concrete bars in 40, 50 and 60-ft. lengths for mill shipment are quoted at 1.75c. a lb., Pittsburgh. Warehouse prices range from 2.44c. a lb., f.o.b. cars New York, for carloads or larger lots to 3.25c. for the smallest tonnages.

Finished Steel.—Demand for finished steel products at best is merely holding its own. It is doubtful whether April sales in this district will show much, if any, gains over those of March. Structural steel lettings are not expanding, the past week having been rather dull in this branch of steel trade. Plate demand is very slow.

Prices lean toward weakness, though are not notably lower. Eastern plate mills are now quite generally quoting 1.85c., Coatesville, Pa., or 2.02½c.,

New York. Structural shapes range from 1.94½c. to 2.04½c., New York, the lower figure applying usually on business with the larger fabricators. Jobbers are able to buy galvanized sheets at 3.25c., Pittsburgh, although 3.30c. applies on other business. Cold-rolled strip steel is not strong at 2.55c., and some large buyers have been able to shade this figure.

Mill prices per lb., deliv'd New York: Soft steel bars, 2.14c. to 2.19c.; plates, 2.02½c. to 2.07½c.; structural shapes, 1.94½c. to 2.04½c.

Warehouse Business.—The tonnage of material sold from stock this month promises to reach a fair total, made up of numerous small orders. Demand for galvanized sheets is less active, and prices on galvanized, black and occasionally blue annealed sheets are still subject to small concessions.

Cast Iron Pipe.—Prices of pressure pipe continue to be fairly well maintained except on especially desirable contracts, such as a recent opening of bids by Washington, on 2100 tons of 8-in., 700 tons of 12-in., 400 tons of 16-in. pipe and 213 tons of fittings. Cumberland, R. I., has opened bids on a contract requiring 2½ miles of pipe and a complete pumping station. The New Jersey State Board of Education, which will build a normal school

at Trenton, N. J., has opened bids on 200 tons of water pipe, and Bedford, Mass., is in the market for about 125 tons of 6 and 8-in. pipe. Middletown, Conn., has awarded 700 tons of 12 to 16-in. water pipe to R. D. Wood & Co.

Prices per net ton deliv'd New York: Water pipe, 6-in. and larger, \$39.90 to \$40.90; 4-in. and 5-in., \$42.90 to \$43.90; 3-in., \$49.90 to \$50.90. Class A and gas pipe, \$3 extra.

Coke.—Offers of distress carloads of furnace coke are increasing and buying is still limited. Much of the distress tonnage is medium sulphur coke, and prices range down to \$2 a net ton, Connellsville, while standard furnace grade continues at \$2.50 to \$2.60, Connellsville. Foundry coke is quoted as follows:

Special brands of beehive foundry coke, \$4.85 a net ton, ovens, or \$8.56 delivered to northern New Jersey, Jersey City and Newark, and \$9.44 to New York and Brooklyn; by-product foundry coke, \$9 to \$9.40, Newark or Jersey City; \$10.06, New York or Brooklyn.

Old Material.—A consumer of No. 1 heavy melting steel at Claymont, Del., has closed on upward of 1000 tons at \$13.50 a ton, delivered, so that brokers are offering \$13 a ton, delivered eastern Pennsylvania, and occasionally, when filling old orders at higher prices, \$13.50 a ton, delivered. Other grades show a tendency to decline on the basis of recent purchases. With a large eastern Pennsylvania consumer of heavy melting steel offering \$7.50 a ton in Brooklyn and \$8 a ton in New Jersey for unprepared steel scrap, yard dealers are beginning to find preparation of No. 1 heavy melting steel unprofitable when brokers are offering only about \$9.50 a ton, New York, for eastern Pennsylvania delivery. For barge movement to Buffalo consumers, \$11 and \$11.25 a ton, on barge, in the Gowanus Canal or the Harlem River are still being paid.

Dealers buying prices per gross ton, f.o.b. New York:

No. 1 heavy melting steel..	\$9.50 to \$11.25
Heavy melting steel (yard)	7.00 to 7.25
No. 1 hvy. breakable cast..	8.75 to 9.75
Stove plate (steel works)..	7.00 to 7.50
Locomotive grate bars....	7.00 to 7.50
Machine shop turnings....	6.50 to 7.00
Short shoveling turnings..	7.00 to 7.25
Cast borings (blast fur.	
or steel works).....	6.50
Mixed borings and turn-	
ings	6.00 to 6.25
Steel car axles	17.00
Iron car axles	20.00 to 20.50
Iron and steel pipe (1 in.	
dia., not under 2 ft. long)	9.25
Forge fire	8.50
No. 1 railroad wrought....	11.25
No. 1 yard wrought, long..	10.25
Rails for rolling	10.25 to 10.75
Stove plate (foundry)....	8.50 to 9.00
Malleable cast (railroad)..	11.50 to 12.00
Cast borings (chemical)...	9.00 to 9.50

Prices per gross ton, deliv'd local foundries:

No. 1 machry. cast.....	\$15.00
No. 1 hvy. cast (columns, bldg. materials, etc.)	cupola size..... 13.00
No. 2 cast (radiators, cast boilers, etc.)	12.50

Warehouse Prices, f.o.b. New York

	Base per Lb.
Plates and structural shapes.....	3.30c.
Soft steel bars, small shapes.....	3.25c.
Iron bars	3.24c.
Iron bars, Swed. charcoal..	7.00c. to 7.25c.
Cold-fin. shafting and screw stock—	
Rounds and hexagons.....	3.40c.
Flats and squares	3.90c.
Cold-roll. strip, soft and quarter	
hard	4.95c.
Hoops	4.25c.
Bands	3.75c.
Blue ann'd sheets (No. 10).....	3.60c.
Black sheets (No. 24*).....	3.80c. to 4.00c.
Galvanized sheets (No. 24*).....	4.25c. to 4.50c.
Long terme sheets (No. 24).....	5.80c.
Standard tool steel.....	12.00c.
Wire, black annealed	4.50c.
Wire, galv. annealed.....	5.15c.
Tire steel, ½ x ½ in. and larger..	3.40c.
Smooth finish, 1 to 2½ x ¼ in.	
and larger	3.75c.
Open-hearth spring steel, bases,	
4.50c. to 7.00c.	
*No. 28 and lighter, 36 in. wide, 20c.	
higher per 100 lb.	
Machine bolts, cut threads:	Per Cent
¾ x 6 in. and smaller.....	Off List
1 x 30 in. and smaller..	.50 to .50 and 10
Carriage bolts, cut thread:	
¾ x 6 in. and smaller.....	.60
¾ x 20 in. and smaller..	.50 to .50 and 10
Boiler Tubes—	Per 100 Ft.
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00
Tin Plate (14 x 20 in.)	
Prime	Seconds
Coke, 100 lb. base box...	\$6.45 \$6.20
Charcoal, per Box	A AAA
IC	\$9.70 \$12.10
IX	12.00 14.25
IXX	13.90 16.00

PHILADELPHIA

Construction Projects Increase— Further Decline in Steel Scrap

PHILADELPHIA, April 29.—Although steel business in this district is limited to small orders and consumers have not made appreciable increases in production, steel mills are generally maintaining operations at about 65 per cent of rated capacity and the leading independent is maintaining a higher rate. One mill, which operated four open-hearth furnaces in February and March, now has five on. Building construction is more active, but most projects require only small tonnages of steel. The largest building awarded in Philadelphia for some months is the Penn Mutual Life Insurance Building, calling for about 6000 tons of steel. A project for canal improvement at Delaware City, Del., on which the United States Engineer's Office is taking bids, includes a substantial tonnage of bolts and nuts, 400 tons of sheet steel piling and 4000 ft. of 19-in. steel pipe.

Pig Iron.—Basic iron has been moderately active, the Midvale Co., Nicetown, closing on about 500 tons and the General Steel Casting Co., Eddystone, Pa., being in the market for a similar tonnage. The latter company is also inquiring for about 200 tons of low phosphorus iron. Birmingham foundry iron continues an active competitor for business in eastern Pennsylvania, and, with many consumers inclined to divide their requirements between Northern and Southern furnaces, local producers are receiving only a part of the total business placed. The eastern Pennsylvania quotation on foundry grade has been maintained recently at \$19.50, base, in the immediate district. A substantial tonnage of Indian pig iron is being sold, but transactions in Dutch pig iron have been small.

Prices per gross ton at Philadelphia:

East. Pa. No. 2, 1.75 to 2.25 sil.	\$20.26
East. Pa. No. 2X, 2.25 to 2.75 sil.	20.76
East. Pa. No. 1X.	21.26
Basic (del'd east. Pa.)	\$18.75 to 19.00
Malleable	21.25
Stand. low phos. (f.o.b. east. Pa. furnace)	24.00
Cop. b'rg low phos. (f.o.b. furnace)	23.00 to 24.00
Va. No. 2 plain, 1.75 to 2.25 sil.	22.29
Va. No. 2X, 2.25 to 2.75 sil.	22.79

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates: 76c. to \$1.64 from eastern Pennsylvania furnaces; \$4.54 from Virginia furnaces.

Reinforcing Bars.—A sizable tonnage of bars is required in projects pending award, but few contracts have been closed. Rail steel bars range from 1.70c. to 1.75c., Franklin, Pa., and Tonawanda, N. Y., or 2.02c. to 2.07c., delivered Philadelphia. On large projects, 1.70c. is occasionally shaded.

Shapes.—Small tonnage building projects are increasing, so that the smaller fabricating shops are better engaged than for some months. Prices of shapes continue at 1.75c. to 1.80c. per lb., f.o.b. nearest mill to consumer, or 1.81c. to 1.86c., delivered Philadelphia. Substantial awards in the past week have included 1700 tons in a viaduct for the Pennsylvania Railroad, 6000 tons in an office building in Philadelphia and 1500 tons in New

Jersey toll bridges for the Ocean Highway Bridge Co.

Plates.—Current buying is limited to small tonnages of plates. Present plate buying is well distributed among consumers, the oil industry showing increasing activity. The price is unchanged at 1.85c. a lb., Coatesville, Pa., or 1.95c., delivered Philadelphia.

Sheets.—Prices show moderate firmness despite reports of concessions in other districts, and lack of any tonnage buying by eastern Pennsylvania consumers. Black sheets range from 2.60c. to 2.65c. per lb., Pittsburgh, or 2.92c. to 2.97c., delivered Philadelphia, the bulk of current business going at the lower quotation. Galvanized sheets are quiet, and the price is unchanged at 3.30c. per lb., Pittsburgh, or 3.62c., delivered Philadelphia.

Imports.—In the week ended April 26, 4057 tons of pig iron arrived at this port, of which 3653 tons was from British India, 354 tons from Norway and 50 tons from Sweden. Steel imports consisted of 53 tons of steel bars, two tons of iron bars, 54 tons of steel rods, 29 tons of steel billets and 22 tons of steel bearing tubes from Sweden, 64 tons of steel bars, 36 tons of steel bands and 26 tons of structural shapes from France, 390 tons of structural shapes, 50 tons

of steel bars and 11 tons of steel bands from Belgium, 104 tons of structural shapes and 73 tons of steel bands from Germany.

Old Material.—The downward trend of the scrap market continues, with No. 1 heavy melting steel quotable at \$13.50 to \$13.75, delivered, following purchase by a Claymont, Del., mill, of about 2000 tons at \$13.75 and 1000 tons at \$13.50 a ton. No. 2 heavy melting steel is also off on purchases by a Pencoyd, Pa., consumer at \$11 and \$11.25 a ton, delivered. Other grades show corresponding weakness on the basis of recent buying.

Prices per gross ton delivered consumers' yards, Philadelphia district:

No. 1 heavy melting steel	\$13.50 to \$13.75
No. 2 heavy melting steel	11.00 to 11.50
Heavy melting steel (yard)	10.50 to 11.00
No. 1 railroad wrought	15.00 to 15.50
Bundled sheets (for steel works)	10.50 to 11.00
Hydraulic compressed, new	12.50 to 12.75
Hydraulic compressed, old	11.00
Machine shop turnings (for steel works)	10.50
Heavy axle turnings (or equiv.)	12.00 to 12.50
Cast borings (for steel works and roll. mill)	10.50
Heavy breakable cast (for steel works)	13.00 to 13.50
Railroad grate bars	10.50
Stove plate (for steel works)	10.50
No. 1 low phos., hvy., 0.04% and under	20.50 to 21.50
Couplers and knuckles	20.00 to 20.50
Rolled steel wheels	19.50 to 20.00
No. 1 blast furnace scrap	10.00 to 10.50
Wrot. iron and soft steel pipes and tubes (new specific.)	13.50
Shafting	18.00 to 18.50
Steel axles	21.00 to 21.50
No. 1 forge fire	12.50 to 13.00
Cast iron carwheels	15.00
No. 1 cast	15.00 to 15.50
Cast borings (for chem. plant)	13.50 to 14.00
Steel rails for rolling	15.00 to 15.50

Bi-monthly examination of the books of companies subscribing to the Amalgamated Association of Iron, Steel and Tin Workers discloses that the rate on bar iron for the next two months will be 1.90c. a lb., a decline of 0.05c. from the figure which has prevailed for the last two months.

Sullivan Machinery Co., 400 North Michigan Avenue, Chicago, has secured sales rights for Tanner-Tanks and Tannergas, which are used for the prevention of freezing in compressed air lines and at the exhaust of compressed air tools.

Soule Steel Co. has purchased the United States Metal Products Co., San Francisco, manufacturer of steel windows, including steel factory sash, casements, French doors, hollow metal sash, fire doors and steel rolling doors. Equipment in the plant of the United States Metal Products Co. will be moved to a new plant now under construction.

Warehouse Prices, f.o.b. Philadelphia

	Base per Lb.
Plates, 1/4-in. and heavier	2.70c.
Plates, 1/8-in.	2.90c.
Structural shapes	2.70c.
Soft steel bars, small shapes, iron bars (except bands)	2.80c.
Reinforc. steel bars, sq., twisted and deform.	2.60c. to 2.80c.
Cold-fin., steel, rounds and hex.	3.40c.
Cold-fin. steel, sq. and flats	3.90c.
Steel hoops	3.55c.
Steel bands, No. 12 to 1/4-in. inclus.	3.30c.
Spring steel	5.00c.
*Black sheets (No. 24)	3.80c.
*Galvanized sheets (No. 24)	4.45c.
Light plates, blue annealed (No. 10)	3.25c.
Blue ann'd sheets (No. 13)	3.40c.
Diam. pat. floor plates, 1/4-in.	5.30c.
Swedish iron bars	6.60c.

*For 50 bundles or more; 10 to 49 bun., 4.10c. base; 1 to 9 bun., 4.35c. base.
†For 50 bundles or more; 10 to 49 bun., 4.95c. base; 1 to 9 bun., 5.30c. base.

CLEVELAND

Seasonal Improvement in Demands for Steel Not Yet Realized

CLEVELAND, April 29.—Demand for finished steel the past week did not hold up to recent volume on the heavier rolled products. Specifications for sheets and hot-rolled strip came out at the recent rate. Steel plant operations in Cleveland declined to 82 per cent of ingot capacity this week. Two plants shut down an open-hearth furnace and another put on an additional unit, or a net loss of one furnace.

On the whole, the situation is somewhat disappointing as the expectations for a seasonal improvement in the demand for steel have not yet been realized. Aside from a further increase in production by the Ford and Chevrolet companies, the present indications are that there will not be much change in production schedules by automobile manufacturers during May.

It is reported that the Ford Motor Co. will increase production next month to 9000 units or more a day. This company, which recently sent out an inquiry for rear fender stampings, has placed the order with a Detroit stampings plant. Few consuming industries in the metal-working field are showing an increase in activities, and buyers are closely limiting purchases to early needs. The building industry is making a better showing at present than most other consuming industries. There was little change in the price situation during the week. Weakness persists in plates and structural shapes, on which shading to 1.75c., Pittsburgh, has become rather common. Efforts to support the market seem to be lacking. Irregularity in sheets continues.

Prices per gross ton at Cleveland:

N'th'n fdy., sil. 1.75 to 2.25	\$19.50
S'th'n fdy., sil. 1.75 to 2.25	19.51
Malleable	19.50
Ohio silvery, 8 per cent..	28.00
Basic Valley furnace.....	18.50
Stand. low phos., Valley...	\$26.50 to 27.00

Prices except on basic and low phosphorus are delivered Cleveland. Freight rates; 50c. from local furnaces; \$3 from Jackson, Ohio; \$6.01 from Birmingham.

Iron Ore.—Activity in the ore market is largely confined to trading between consumers who own their own ore properties. The practice among producers and consumers of trading ore so that each may secure grades meeting his requirements has been more common this season than ever before and has tended to cause a decrease in open market sales.

The vessel rates on ore that prevailed last year have been reestablished for this season. These are 70c. a gross ton on shipments from the head of Lake Superior and 63c. from Marquette. The rate from Escanaba is 52½c. to Lake Erie ports and 42c. to Lake Michigan ports. The first ore cargo of the season was shipped from Escanaba April 25. Last year upward of 2,000,000 tons of ore was shipped in April, but this year the April shipments will be very light.

Strip Steel.—Specifications for hot-rolled strip are fairly good. Mills are still able to get 1.80c. Pittsburgh for wide strip and 1.90c. for narrow from many of their customers, although much of the round-lot business is going at \$2 a ton lower. Cold-rolled

strip continues very dull, but 2.55c. Cleveland is being maintained as a minimum price. A round-lot inquiry for fender stock brought out a quotation of 3.80c. or \$2 a ton below the regular price.

Pig Iron.—The market continues rather quiet, although one producer sold 7000 tons during the week, or more than during the previous week. There is virtually no activity in the northern Ohio territory. Shipping orders are being maintained at their recent increase, and April shipments will show a gain of 10 or 15 per cent over those of March. Shipments to the automotive industry in Michigan are expected to improve slightly in May over April.

Most foundries are buying only for their early requirements. Business continues slow with jobbing foundries in this territory. As local production has been reduced by the recent blowing out of two furnaces, one by each producer, these interests are not showing a great deal of activity at present in pushing sales outside of their immediate territory.

Local prices are unchanged at \$18.50, furnace, for foundry and malleable iron for outside shipment and \$19 for Cleveland delivery. While the \$19.50 price is still in effect in eastern Michigan, concessions to \$19 are reported in the western part of the State, due to recent competition of steel plant iron. In northern Indiana, the range of \$18.50 to \$19 still prevails.

Cold-finished Steel Bars.—Orders have improved slightly recently, but shipments are larger against first quarter contracts carried over to the second quarter. The market is firm at 2.10c., Cleveland.

Bars, Plates and Shapes.—Demand for shapes is fairly active. The recent volume of business in steel bars was not maintained the past week. Plates are still very quiet. Recent awards of building work have brought out considerable tonnage of structural shapes, but not much new inquiry is pending in this territory. Awards during the week included 7000 tons for the Dayton Terminal Co.

Steel bars appear to be holding firm-

ly to 1.80c., Cleveland, for delivery in this territory. Plates and shapes are somewhat irregular, with a range of 1.75c. to 1.80c., Pittsburgh. Reinforcing bars are in light demand, quotations of 1.75c., mill, appearing on rail steel bars.

Sheets.—New demand continues moderate, showing little change in the past two or three weeks. Mills in this territory are maintaining operations at about 65 per cent of capacity. Fair releases are coming from a local plant making Chevrolet bodies, which is stepping up production. Some of the stove manufacturers are going fairly well, but business is slack with makers of metal furniture and partitions. Black sheets show increased weakness, quotations of 2.55c., Pittsburgh, and 2.65c., Valley, having become quite common. On galvanized sheets, there are occasional reports of 3.25c., although most mills are holding to 3.30c. Some business in fair-sized lots came out during the week in auto body sheets, on which 3.80c. is being maintained.

Wire Products.—Manufacturers' wire is moving slightly better than recently. Jobbers have reduced their price 15c. a keg to \$2.50 for less than carload for stock shipment.

Old Material.—Activity is confined to small-lot purchases by dealers who are cleaning up on old orders. There is some demand in the Youngstown district from dealers for No. 1 heavy melting steel, for which \$15.50 is being paid. Shipments to local mills are still greatly restricted. Machine shop turnings are slightly firmer, and borings and turnings show weakness. Other grades are unchanged.

Prices per gross ton delivered consumers' yards:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel..	\$13.25 to \$13.75
No. 2 heavy melting steel..	12.75 to 13.25
Compressed sheet steel...	12.75 to 13.00
Light bundled sheet stampings	11.00 to 11.50
Drop forge flashings.....	11.00 to 11.50
Machine shop turnings.....	9.00 to 9.50
Short shoveling turnings..	10.50 to 11.00
No. 1 railroad wrought....	13.00 to 13.50
No. 2 railroad wrought....	14.00 to 14.50
No. 1 busheling	12.00 to 12.50
Pipes and flues	9.00 to 9.50
Steel axle turnings.....	12.50 to 13.00
Acid Open-Hearth Grades:	
Low phos., forging crops..	17.75 to 18.00
Low phos., billet bloom and slab crops	18.50 to 18.75
Low phos., sheet bar crops	18.00 to 18.50
Low phos., plate scrap....	18.00 to 18.50
Blast Furnace Grades:	
Cast iron borings	10.00 to 10.50
Mixed borings and short turnings	10.00 to 10.50
No. 2 busheling	9.25 to 9.50
Cupola Grades:	
No. 1 cast	15.00 to 15.50
Railroad grate bars	11.00 to 12.00
Stove plate	12.00 to 12.50
Rails under 3 ft.	18.50 to 19.50
Miscellaneous:	
Rails for rolling	16.25 to 16.50
Railroad malleable	16.00 to 16.50

BUFFALO Steel Operations Tapering Slightly—Pig Iron and Scrap Dull

BUFFALO, April 29.—Pig iron business has been confined to the sale of a few small lots. No sizable inquiries are out. The week's sales by all furnaces in this district were probably less than 5000 tons. Shipping directions against old business are increasing. Shipment by canal has begun. It is probable that one of the furnaces of the Lackawanna plant of the Bethlehem Steel Co. will be banked soon, leaving four in blast.

Prices per gross ton f.o.b. furnace:

No. 2 fdy., sil. 1.75 to 2.25.....	\$18.50
No. 2X fdy., sil. 2.25 to 2.75.....	19.00
No. 1 fdy., sil. 2.75 to 3.25.....	20.00
Malleable, sil. up to 2.25.....	19.00
Basic.....	17.50
Lake Superior charcoal.....	27.28

Finished Steel.—Schedules of Buffalo mills show that the Lackawanna plant of Bethlehem Steel Co. is operating 19 of 24 open-hearths; Donner Steel Co., four of nine; Wickwire-Spencer, two of four; Gould Coupler Co., two basic and one acid of a total of five. The Seneca Iron & Steel Co. is operating approximately 85 per cent. Operations have shown no increase in several weeks, and have, in fact, tapered off slightly. There has been very little fabricated structural or reinforcing bar business, the only structural steel commitment being one of 100 tons for a Buffalo store and office building.

Old Material.—Unverified reports in this market are that one interest has bought 2000 tons of No. 1 heavy melting steel at \$14.50. This material, it is understood, is to be shipped by canal from the East, and the price is reported about 75c. under that last paid by this buyer. Another report is that a company, which has been paying \$14 a ton, has recently paid \$14.25 for a tonnage. Dealers are paying \$13.75 against previous \$14 orders. Boat shipments of hydraulic com-

Warehouse Prices, f.o.b. Buffalo

	Base per lb.
Plates and struc. shapes.....	3.40c.
Soft steel bars.....	3.30c.
Reinforcing bars.....	2.95c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.85c.
Black sheets (No. 24).....	4.20c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'd sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$3.20
Black wire, base per 100 lb.....	3.50

pressed sheets from Detroit have got through the ice on Lake Erie. A sale of cast iron car wheels at \$13.50 is noted, but most of the commodities are softer.

Prices per gross ton f.o.b. Buffalo consumers' plants:

Basic Open-Hearth Grades:	
No. 1 heavy melting steel.....	\$14.00 to \$15.00
No. 2 heavy melting scrap.....	12.50
Scrap rails.....	14.00 to 15.00
Hydraul. comp. sheets.....	12.50
Hand bundled sheets.....	10.00 to 10.50
Drop forge flashings.....	12.50
No. 1 busheling.....	13.00 to 13.75
Hvy. steel axle turnings.....	13.00 to 13.50
Machine shop turnings.....	8.00 to 9.00
No. 1 railroad wrought.....	10.50 to 11.00
Acid Open-Hearth Grades:	
Knuckles and couplers.....	16.50 to 17.00
Coil and leaf springs.....	16.50 to 17.00
Rolled steel wheels.....	16.50 to 17.00
Low phos. billet and bloom ends.....	17.50 to 18.00
Electric Furnace Grades:	
Short shov. steel turnings.....	11.50 to 11.75
Blast Furnace Grades:	
Short mixed borings and turnings.....	10.50 to 11.00
Cast iron borings.....	10.50 to 11.00
No. 2 busheling.....	8.00
Rolling Mill Grades:	
Steel car axles.....	16.50 to 17.00
Iron axles.....	19.50 to 20.00
Cupola Grades:	
No. 1 machinery cast.....	12.50 to 13.00
Stove plate.....	11.50 to 12.00
Locomotive grate bars.....	10.00 to 10.50
Steel rails, 3 ft. and under.....	16.50 to 17.00
Cast iron carwheels.....	11.50 to 12.00
Malleable Grades:	
Industrial.....	16.00 to 16.50
Railroad.....	16.00 to 16.50
Agricultural.....	16.00 to 16.50
Special Grades:	
Chemical borings.....	11.50 to 12.00

YOUNGSTOWN Specifications and Shipments Slightly Ahead of Those of March

YOUNGSTOWN, April 28.—Valley steel mills are completing the first month of the quarter with both new specifications and shipments running slightly ahead of those of March, but with no general improvement in business. Throughout the month operations both in steel-making and finishing departments have fluctuated widely because of the unequal distribution of business, and there is little likelihood that the next month will see any marked change in this condition. The general average of finishing mill operations has been about 10 per cent higher than in March, but, as crude steel stocks were rather ample at the beginning of the month, ingot production did not show this much of an increase.

The partial recovery of the automobile industry has demonstrated to Valley mills that the restricted requirements of this consuming line are

by no means entirely responsible for light demand for steel. With the two largest makers of small motor cars scheduled at practical capacity for May, several Valley mills are still badly in need of business for their flat rolling departments, although those companies which share heavily in Ford and Chevrolet tonnage are maintaining a good operation in some departments.

One large independent has been able to schedule its hot-rolled strip mills from 10 days to two weeks in advance, but part of the material will go into the manufacture of tubing and not to the motor car industry. At some points full-finished sheet mills are also well occupied, with 85 to 90 per cent schedules, but this operating rate is 15 to 20 per cent ahead of the average rate for the sheet industry in this district.

Cold-rolled strip is also very dull,

with operations well under 50 per cent. In spite of the lack of business, competition for available tonnage is keen, and the 2.55c. Pittsburgh price on cold-rolled strip is very weak, if not quotably lower. Hot-rolled strip quotations are holding much better, but occasional concessions are reported.

Valley mills are still quoting 2.65c. on black sheets, and are taking some tonnage at this figure. On desirable business the ruling price is \$2 less. The price on No. 10 gage light plates has also weakened, and jobbing mills are now going to 2c. on large tonnages, as opposed to a 2.10c. minimum which was held up until a few weeks ago. Corresponding material from continuous mills is being sold at 1.80c. and 1.90c., Pittsburgh, although the lower figure is said to represent the quotation of producers outside the Valley district. Blue annealed sheets are quotable at 2.15c. to 2.25c., although the lower figure is not so common as the corresponding quotation on light plates. Continuous mill prices average about \$4 a ton less. Galvanized sheets are still holding at 3.30c., Pittsburgh, and Valley mills contend that concessions of \$1 and \$2 a ton, which have been reported on jobber business in the East, are not being met in the natural Youngstown territory. Automobile body sheets are holding at 3.80c., Pittsburgh, and quotations on metal furniture stock appear to be settling to the same level.

Bar mills in the Valleys have reduced their operations slightly in the aggregate, and lack of business is attributed partly to the price situation. Quotations of 1.80c., Pittsburgh or Cleveland, now represent the general market, and 1.75c. has been done in Detroit. The same situation applies to plates, and Valley mills which do not enter the Eastern market except on rare occasions are maintaining a 1.80c., Pittsburgh, price. Wire and nails are rather quiet, although prices seem to be holding somewhat better. The leading local producer of nails is maintaining \$2.20, Pittsburgh, on the general run of business.

Demand for tubular goods, which means a great deal to Valley steel companies, is still rather unsatisfactory. Improvement over March is generally reported, but March tonnage was so light that such comparisons may easily be overrated. April specifications for butt-weld material of one large company are running 25 per cent ahead of the previous month, but even so are very disappointing. Business in lap-weld and seamless material is somewhat better, although individual orders are small and local producers have not shared in many of the comparatively large projects which have been placed thus far in the year. The electric welding unit of the Republic Corporation is booked for several weeks on 4-in. and 6-in. pipe, and the larger mill, which is expected to get into production about May 15, will start out with a fair backlog.

The primary markets are dull, with

shipments of pig iron not keeping up with production at several furnaces, and new business confined entirely to small lots. Demand for semi-finished steel is spotty, with a few non-integrated mills taking heavy shipments, and others running very slow-

ly. Opposition to the \$33, Youngstown, price on sheet bars, billets and slabs, is general, but mills are still trying to maintain the figure. The scrap market is listless, but shipments are in fair volume, and new buying is expected early next month.

tons of 6 to 12-in. pipe to R. D. Wood & Co., while the Donaldson Iron Co. has been awarded 200 tons by Littleton, Mass., 170 tons by Bedford, Mass., and 150 tons by Medway, Mass. On May 1, Hanover, Mass., will close bids on 20 miles of 6 and 12-in. pipe. Peabody, Mass., closed bids April 28, on a round tonnage of 6 to 12-in. pipe. Palmer, Mass., is in the market for 400 tons of 6 to 16-in. pipe.

BOSTON Pig Iron Sales at Low Point—Concessions on Cast Iron Pipe

BOSTON, April 29.—Pig iron sales the past week totaled less than 2000 tons. No inquiries of importance are out. The melt of iron in New England is not more than 3 per cent greater than on April 1; foundries are again holding up specifications, and most melters apparently have sufficient iron on hand or on order to carry them to June, or later at the current rate of melt. Buffalo No. 2 plain and No. 2X iron is now available at \$16.50 a ton, furnace, and No. 1X at \$17, but sellers admit that less could be done on 1000-ton or larger lots. Furnaces east of Buffalo are quoting prices a shade under the equivalent of Buffalo delivered in New England. Imported iron is hardly a factor in this market today.

Foundry iron prices per gross ton deliv'd to most New England points:

†Buffalo, sil. 1.75 to 2.25..	\$20.28 to \$21.28
†Buffalo, sil. 2.25 to 2.75..	20.78 to 21.78
*Buffalo, sil. 1.75 to 2.25..	20.91 to 21.91
*Buffalo, sil. 2.25 to 2.75..	21.41 to 22.41
Va., sil. 1.75 to 2.25.....	25.21
Va., sil. 2.25 to 2.75.....	25.71
*Ala., sil. 1.75 to 2.25.....	22.61
*Ala., sil. 2.25 to 2.75.....	23.11
†Ala., sil. 1.75 to 2.25.....	18.75
†Ala., sil. 2.25 to 2.75.....	19.25

Freight rates: \$4.91 all rail and \$4.28 rail and water from Buffalo; \$5.21 all rail from Virginia; \$9.61 all rail from Alabama and \$5.75 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

Reinforcing Bars.—Sales of reinforcing bars the past week approximated 1000 tons, including 300 tons

for a Laconia, N. H., mill, 125 tons for a Belmont, Mass., hospital, and 100 tons for a New Haven, Conn., bridge, all billet steel stock. New prospects include 230 tons for a Worcester, Mass., shoe plant, 180 tons for a Pittsfield, Mass., telephone exchange and 117 tons for East Boston playground bleachers. For the East Boston job, rail steel bars probably will be used. The market for rail steel bars is generally 2.26½c., base, delivered Boston freight rate points, while open quotations on billet steel bars are: 1 to 5-ton lots, 3.06½c. a lb., base, from stock; 5 to 99 tons, 2.66½c.; 100-ton and larger lots, 2.56½c.

Cast Iron Pipe.—Not all cast iron pipe makers are holding to \$37 to \$38 a ton, foundry, for 6 to 12-in. pipe, and price concessions of \$3 to \$4 a ton are obtainable on 16-in. stock. The Warren Foundry & Pipe Co. has been awarded 140 tons of 16-in. pipe by Winthrop, Mass., on its bid of \$40.60 a ton, delivered East Boston, or \$34.80 at foundry. Herbert Kennedy Co., representing French pipe makers, was the low bidder at \$38.45 a ton, delivered, and other bidders included United States Pipe & Foundry Co., \$40.80; Donaldson Iron Co., \$40.90; F. Houdlett Co., \$42.90; and the National Cast Iron Pipe Co., \$45.

Cumberland, R. I., has awarded 700

Old Material.—No. 1 heavy melting steel for eastern and western Pennsylvania delivery is moving in a small way at \$9.10 to \$9.50 a ton, on cars shipping point, steel turnings and steel mill borings generally at \$5.50, mixed borings and turnings at \$5, and forge flashings at \$8 mostly, while some shafting was bought the past week at \$13 and \$15, depending on the desirability of material. Other kinds of scrap are dull, especially forge scrap and long bundled skeleton, now that a Worcester, Mass., consumer is out of the market for the latter. Prices continue to decline.

Buying prices per gross ton, f.o.b. Boston rate shipping points:

No. 1 heavy melting steel..	\$9.00 to \$9.50
Scrap T rails	9.00 to 9.50
Scrap girder rails	8.10 to 8.50
No. 1 railroad wrought..	10.00 to 10.50
Machine shop turnings....	5.00 to 5.50
Cast iron borings (steel works and rolling mill)..	5.00 to 5.50
Bundled skeleton, long....	8.00 to 8.25
Forge flashings	8.00 to 8.25
Blast furnace borings and turnings	5.00 to 5.50
Forge scrap	7.00 to 8.00
Shafting	13.00 to 15.00
Steel car axles	16.00 to 16.50
Wrought pipe, 1 in. in diameter (over 2 ft. long)	8.00 to 8.50
Rails for rolling	10.50 to 11.00
Cast iron borings, chemical	8.50 to 9.00

Prices per gross ton deliv'd consumers' yards:

Textile cast	\$12.00 to \$13.50
No. 1 machinery cast....	14.50 to 15.25
No. 2 machinery cast....	14.00 to 14.50
Stove plate	10.50 to 11.00
Railroad malleable	16.00 to 16.50

Warehouse Prices, f.o.b. Boston

	Base per Lb.
Plates	3.365c.
Structural shapes—	
Angles and beams	3.365c.
Tees	3.365c.
Zees	3.465c.
Soft steel bars, small shapes....	3.265c.
Flats, hot-rolled	4.15c.
Reinforcing bars	3.265c. to 3.54c.
Iron bars—	
Refined	3.265c.
Best refined	4.60c.
Norway rounds	6.60c.
Norway squares and flats.....	7.10c.
Spring Steel—	
Open-hearth	5.00c. to 10.00c.
Crucible	12.00c.
Tie steel	4.50c. to 4.75c.
Bands	4.015c. to 5.00c.
Hoop steel	5.50c. to 6.00c.
Cold-rolled steel—	
Rounds and hex....	*3.55c. to 5.55c.
Squares and flats....	*4.05c. to 7.05c.
Toe calk steel	6.00c.
Rivets, structural or boiler.....	4.50c.
	Per Cent Off List
Machine bolts .....	.50 and 5
Carriage bolts .....	.50 and 5
Lag screws .....	.50 and 5
Hot-pressed nuts .....	.50 and 5
Cold-punched nuts .....	.50 and 5
Stove bolts .....	.70 and 10

*Including quantity differentials.

BIRMINGHAM

Steel Business Beginning to Lag—Pig Iron Shipments Exceed Output

BIRMINGHAM, April 29.—April shipments of pig iron by the three merchant producers in Birmingham will be slightly in excess of production. Southern melters have been taking iron at an even rate, but shipments on Northern contracts have lagged somewhat. New business is small. The base price for district sales remains at \$14. The total of 17 active furnaces is the same as for some weeks.

Prices per gross ton, f.o.b. Birmingham dist. furnaces:

No. 2 fdy., 1.75 to 2.25 sil.....	\$14.00
No. 1 fdy., 2.25 to 2.75 sil.....	14.50
Basic	14.00

Finished Steel.—Present business is sufficient to maintain full time operations. However, seasonal recessions have developed in some lines, such as sheets and fencing, and others are showing a tendency toward weakness.

On the whole, the market is only fair. There are no price changes. Structural steel fabricators had a quiet week, as did the reinforcing bar plants. Only one structural contract of consequence was reported—700 tons for tower line and substation structures placed by the Georgia Power Co. with the Nashville Bridge Co.

The Tennessee company operated 15 open-hearths last week, eight at Ensley and seven at Fairfield, one less than in the preceding week. The Gulf States Steel Co. continues with four. This company plans to rebuild all of its open-hearths, six in number, increasing capacity of each from 75 to 90 tons. Work on one has been completed and is in progress on two others. The remainder will be changed as they go out for repairs.

The new blooming mill of the Gulf

States Steel Co. is operating on double turn, primarily to roll the ingots that accumulated during the shutdown required for the installation of the new mill.

Cast Iron Pipe.—Bids were opened last week by Detroit on about 4000 tons of pipe. No awards have been made, but it is expected that Birmingham plants will receive at least a portion of the tonnage. The Charlotte, N. C., tonnage, amounting to a little more than two miles of pipe, was placed with the Lynchburg Foundry Co., Lynchburg, Va. Routine business is providing a comfortable aggregate of new business, but buying is spasmodic and large tonnages are infrequent. Base prices are holding at \$37 to \$38.

Coke.—Demand and shipments are

about as usual for this period of the year. Quotations remain at \$5 for both spot and contract. In the last issue it was stated that the Semet-Solvay Co. had placed 300 additional ovens in operation. This should have read 30 ovens.

Old Material.—Steel scrap continues to move at a fair rate, but cast iron grades are inactive. Prices are stationary.

Prices per gross ton, deliv'd Birmingham dist. consumers' yards:
Heavy melting steel.....\$13.00 to \$13.50
Scrap steel rails.....14.00
Short shoveling turnings.....9.00
Cast iron borings.....9.00
Stove plate.....11.50 to 12.00
Steel axles.....22.00
Iron axles.....23.00
No. 1 railroad wrought.....10.00 to 10.50
Rails for rolling.....15.50
No. 1 cast.....13.00
Tramcar wheels.....12.50
Cast iron carwheels.....13.00 to 13.50
Cast iron borings, chem.. 13.50 to 14.00

ST. LOUIS Pig Iron Buying Light—Sheet Orders Show Some Improvement—Scrap Weak

ST. LOUIS, April 29.—This has been a dull week in the pig iron market. A leading Southern maker sold approximately 2000 tons, while the St. Louis Gas & Coke Corporation sold about 1000 tons in scattered lots. Light buying is due to the fact that some melters are well covered as the result of heavy purchases several months ago. Shipments of the local maker for April probably will equal those of March, its heaviest month since last October for the movement of pig iron.

The Federal Reserve Bank reports that since April 1, there have been some additions to working forces of melters, notably in jobbing foundries and plants specializing in automobile materials.

Prices per gross ton at St. Louis:
No. 2 fdy., sil. 1.75 to 2.25, f.o.b. Granite City, Ill. \$19.50
Malleable, f.o.b. Granite City 20.00
N'th'n No. 2 fdy., deliv'd St. Louis 22.16
Southern No. 2 fdy., deliv'd \$17.42 to 18.42
Northern malleable, deliv'd 22.16
Northern basic, deliv'd.... 22.16

Freight rates: 75c. (average) Granite City to St. Louis; \$2.16 from Chicago; \$4.42 from Birmingham.

Warehouse Prices, f.o.b. St. Louis

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.15c.
Cold-fin, rounds, shafting, screw stock.....	3.75c.
Black sheets (No. 24).....	4.25c.
Galv. sheets (No. 24).....	4.85c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	4.30c.
Galv. corrug. sheets.....	4.90c.
Structural rivets.....	4.15c.
Boiler rivets.....	4.15c.
Per Cent Off List	
Tank rivets, 7/8-in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	60
Carriage bolts.....	60
Lag screws.....	60
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	60
Less than 200 lb.....	50

Finished Steel.—The Granite City Steel Co. reports that incoming business continues somewhat below normal, although the first three weeks in April showed some improvement in demand for galvanized sheets as compared with the corresponding period in March. Orders continue to call for small amounts, but specifications are sent in more frequently.

The Terminal Railway Association purchased 2500 kegs of track spikes from the Illinois Steel Co. Buying by railroads generally is light. Structural business is dull.

Old Material.—The market continues weak, with prices lower on some items. Mills in this district are

buying very little, and some dealers do not look for improvement soon. Distress cars are few in number, and shipments from country dealers to this market amount to very little because of low prices. Dealers have been shipping angle bars and malleable grades to Chicago, which provides a better market for these items. Selected heavy melting steel is 25c. lower; No. 1 locomotive tires and No. 1 railroad cast, railroad springs No. 1 machinery cast are 50c. down, rails for rolling are 75c. lower, and iron rails have been reduced \$2.

Railroad lists: Missouri-Kansas-Texas, 300 tons; Chicago Milwaukee, St. Paul & Pacific, 185 carloads; New York Central, 40 carloads; St. Louis-San Francisco, 56 carloads; Nashville, Chattanooga and St. Louis, 13 carloads.

Dealers' buying prices per gross ton, f.o.b. St. Louis district:

Selected heavy melting steel.....	\$12.50 to \$13.00
No. 1 heavy melting or shoveling steel.....	11.75 to 12.25
No. 2 heavy melting or shoveling steel.....	11.00 to 11.50
No. 1 locomotive tires.....	14.00 to 14.50
Misc. stand-sec. rails including frogs, switches and guards, cut apart.....	12.50 to 13.00
Railroad springs.....	14.50 to 15.00
Bundled sheets.....	8.50 to 9.00
No. 2 railroad wrought.....	11.75 to 12.25
No. 1 busheling.....	9.75 to 10.25
Cast iron borings and shoveling turnings.....	9.25 to 9.75
Iron rails.....	11.00 to 11.50
Rails for rolling.....	13.25 to 13.75
Machine shop turnings.....	6.75 to 7.25
Heavy turnings.....	9.00 to 9.50
Steel car axles.....	17.00 to 17.50
Iron car axles.....	25.50 to 26.00
Wrot. iron bars and trans.....	18.00 to 18.50
No. 1 railroad wrought.....	10.50 to 11.00
Steel rails, less than 3 ft.....	15.00 to 15.50
Steel angle bars.....	12.00 to 12.50
Cast iron carwheels.....	13.50 to 14.00
No. 1 machinery cast.....	13.50 to 14.00
Railroad malleable.....	13.50 to 14.00
No. 1 railroad cast.....	12.50 to 13.00
Stove plate.....	10.50 to 11.00
Relay, rails, 60 lb. and under.....	20.50 to 23.50
Relay, rails 70 lb. and over.....	26.50 to 29.00
Agricult. malleable.....	12.50 to 13.00

PACIFIC COAST

SAN FRANCISCO, April 26 (*By Air Mail*).—The Pacific Fruit Express has ordered 3625 tons of steel for the rebuilding of 500 refrigerator cars. The Western Pipe & Steel Co. will furnish 1450 tons of plates and 925 tons of structural material; the Palm Bridge & Iron Works, Sacramento, Cal., will fabricate 1000 tons of structural material for underframes, and the Pacific Coast Engineering Co. will use 250 tons of steel for 1004 car ladders.

In building construction work, the largest award was 450 tons of structural steel for a gymnasium for the University of Southern California. Bids have been opened on 375 tons for a bridge over the Mojave River at Sacramento. Bookings of reinforcing steel have been in small lots.

Prices of the heavy hot-rolled products are unchanged. Plates are quoted at 2.20c., c.i.f., shapes at 2.35c. Out-of-stock prices on bars in the San Francisco district remain at 2.30c., base, in

Pacific Fruit Express Orders 3625 Tons of Steel for Repairs

carload lots, while at Los Angeles quotations are \$2 a ton higher.

Pig Iron.—Sales are in small lots. Jobbing foundries report no gain in operations. Pig iron prices are unchanged.

Prices per gross ton at San Francisco:

*Utah basic.....	\$25.00 to \$26.00
*Utah fdy., sil. 2.75 to 3.25.....	25.00 to 26.00
**Indian fdy., sil. 2.75 to 3.25.....	25.00 to 26.00
*Delivered San Francisco.	
**Duty paid, f.o.b. cars San Francisco.	

Warehouse Prices, f.o.b. San Francisco

	Base per Lb.
Plates and struc. shapes.....	2.45c. to 2.95c.
Soft steel bars.....	2.40c. to 2.95c.
Black sheets (No. 24).....	3.65c. to 4.30c.
Blue ann'l'd sheets (No. 10).....	3.05c. to 3.55c.
Galv. sheets (No. 24).....	4.30c. to 4.80c.
Struc. rivets, 1/2-in. and larger.....	5.65c.
Com. wire nails, base per keg.....	\$3.40
Cement c't'd nails, 100 lb. keg.....	3.40

Cast Iron Pipe.—The American Cast Iron Pipe Co. took 161 tons of 4 to 8-in. Class 150 pipe for the Los Angeles County Water Works District No. 10. Wenatchee, Wash., placed 644 tons of 4 to 12-in. Class B pipe with the United States Pipe & Foundry Co. Bids will be opened on April 28 for 309 tons of 6 and 8-in. Class 150 pipe for San Francisco. Bellingham, Wash., will open bids on May 1 for 278 tons of 4 to 12-in. Class B pipe.

Railroad Material.—The United States Steel Products Co. has secured an order for 200 rolled steel car wheels for the San Francisco Municipal Railroad at \$35.50 each.

Canada

Pig Iron Business Ahead of First Quarter

TORONTO, ONT., April 29.—Second quarter contracting for pig iron shows a gain of about 10 per cent over the first three months of the year. Some fairly good inquiries are out for foundry iron to be delivered when Great Lakes navigation is well under way. Pig iron production is creeping up gradually, but is much below the high record of a year ago. Pig iron prices are unchanged.

Prices per gross ton:

Delivered Toronto	
No. 1 fdy., sil. 2.25 to 2.75.....	\$22.60
No. 2 fdy., sil. 1.75 to 2.25.....	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sil. 2.25 to 2.75.....	\$24.00
No. 2 fdy., sil. 1.75 to 2.25.....	23.50
Malleable	24.00
Basic	22.50
Imported Iron, Montreal Warehouse	
Summerlee	\$33.50
Carron	33.00

Old Material.—Buying by mills in the Hamilton district continues somewhat restricted, although sales for the week were the largest of the month. Small tonnage business is coming out, but nothing has developed in large contracts either for spot or future delivery.

Dealers' buying prices:

Per Gross Ton		
	Toronto	Montreal
Heavy melting steel.....	\$9.00	\$8.00
Rails, scrap	11.00	9.00
No. 1 wrought	9.00	11.00
Machine shop turnings.....	7.00	6.00
Boiler plate	7.00	6.50
Heavy axle turnings.....	7.50	6.50
Cast borings	6.50	5.00
Steel borings	6.50	6.00
Wrought pipe	6.00	6.00
Steel axles	14.00	17.00
Axles, wrought iron.....	16.00	19.00
No. 1 machinery cast.....	16.00	16.00
Stove plate	12.00	12.00
Standard carwheels.....	14.50	14.50
Malleable	13.00	13.00
Per Net Ton		
No. 1 mach'y cast.....	\$15.00	....
Stove plate	11.00	....
Standard carwheels.....	14.00	....
Malleable scrap.....	11.00	....

Chicago branch sales office and warehouse of the Bunting Brass & Bronze Co., Toledo, Ohio, has been moved to 1221 West Washington Boulevard.

CINCINNATI

Pig Iron Melt Declining—Sheet Mill Operations at 60 Per Cent

CINCINNATI, April 29.—With the district melt down to about 65 per cent, and foundries curtailing production, the demand for pig iron in this district has receded sharply. Total sales for the week were approximately 2800 tons, a decrease of almost 1400 tons from the preceding week. About 600 tons in small lots went to Southern furnaces at the prevailing quotation of \$13, base Birmingham. The only sizable order of the week was from a central Ohio consumer for 500 tons of Northern foundry iron.

Prices per gross ton, deliv'd Cincinnati:

So. Ohio fdy., sil. 1.75 to 2.25	\$19.89 to \$20.39
Ala. fdy., sil. 1.75 to 2.25	16.69 to 17.69
Ala. fdy., sil. 2.25 to 2.75	17.19 to 18.19
Tenn. fdy., sil. 1.75 to 2.25	17.19 to 17.69
S'th'n Ohio silvery, 8 per cent	26.89

Freight rates, \$1.89 from Ironton and Jackson, Ohio; \$3.69 from Birmingham.

Coke.—With the melt off, specifications for foundry coke are below normal and a trifle under the March level. Prices on by-product foundry coke will continue at about \$10.05, delivered in Cincinnati, for May.

Finished Material.—With the specifications from automobile manufacturers noticeably below the level of last year and other users of sheets buying on a hand-to-mouth basis, the demand for sheets in this district continues at about 60 per cent of capacity.

As mills depend on current bookings to sustain operations, present schedules call for operations at about 60 per cent of capacity. The leading interest in this district states that there is practically no forward buying, and present purchases are for rush delivery to cover immediate needs.

March a Good Month in Gray Iron Castings

Production by gray iron foundries showed a gain during March over February, according to the monthly report of the Gray Iron Institute, Cleveland, based on data supplied by 142 foundries. These operated during March at 92.8 per cent of normal production as compared with 85.5 per cent in February. During March last year operations were at 135.4 per cent of normal production.

New business received during March, 76 foundries reporting, was on the basis of 78 per cent as compared with 98.2 per cent in February, and with 135.5 per cent in March last year. Unfilled orders March 31, of 76 foundries, were 55.9 per cent as compared with 70 per cent on Feb. 28, and with 118.1 per cent March 31, a year ago. Of 118 foundries reporting on the business outlook 12 said it is good, 70 fair, 32 poor and 4 bad.

Data of operations by districts in-

Warehouse Prices, f.o.b. Cincinnati

Base per Lb.	
Plates and struc. shapes.....	3.40c.
Bars, soft steel or iron.....	3.30c.
New billet reinfrc. bars.....	3.30c.
Rail steel reinfrc. bars.....	3.15c.
Hoops	4.05c.
Bands	3.50c.
Cold-fin. rounds and hex.....	3.85c.
Squares	4.35c.
Black sheets (No. 24).....	4.05c.
Galvanized sheets (No. 24).....	4.90c.
Blue ann'l'd sheets (No. 10).....	3.45c.
Structural rivets	4.20c.
Small rivets .....	.60 per cent off list
No. 9 ann'l'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (25 kegs or more)	2.95
Cement c't'd nails, base 100 lb. keg	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Lap-welded steel boiler tubes, 2-in. 4-in.	\$16.50
Seamless steel boiler tubes, 2-in. 4-in.	34.50
Seamless steel boiler tubes, 2-in. 4-in.	17.50
Seamless steel boiler tubes, 2-in. 4-in.	36.00

Old Material.—The scrap market is quiet and featureless. With mills curtailing operations, specifications for scrap are being held at a minimum. Dealers are wary of selling short, since the present price schedule is not firm and a feeling of uncertainty underlies the market. Low prices have tended to "freeze up" some sources of scrap supply.

Dealers' buying prices per gross ton, f.o.b. cars, Cincinnati:

Heavy melting steel.....	\$11.50 to \$12.00
Scrap rails for melting.....	13.00 to 12.50
Loose sheet clippings.....	8.00 to 8.50
Bundled sheets	10.75 to 11.25
Cast iron borings	8.00 to 8.50
Machine shop turnings.....	7.75 to 8.25
No. 1 busheling	9.75 to 10.25
No. 2 busheling	6.25 to 6.75
Rails for rolling	13.00 to 13.50
No. 1 locomotive tires.....	14.00 to 14.50
No. 2 railroad wrought.....	11.50 to 12.00
Short rails	17.75 to 18.25
Cast iron carwheels	12.00 to 12.50
No. 1 machinery cast.....	18.50 to 19.00
No. 1 railroad cast.....	15.00 to 15.50
Burnt cast	9.25 to 9.75
Stove plate	9.25 to 9.75
Brake shoes	9.25 to 9.75
Agricultural malleable.....	14.00 to 14.50
Railroad malleable	15.00 to 15.50

indicated that foundries in Wisconsin, Illinois and all territory west of the Mississippi River are operating better than in other districts. These with 51 foundries reporting operated at 107.2 per cent of normal production during March. Foundries in Pennsylvania, Michigan, Ohio, Indiana and the southern territory east of the Mississippi River according to the reports of 52 plants operated at 86.7 per cent in March. Those in the New England States, New York, New Jersey and Canada, 39 reporting, operated at 82.8 per cent.

Classifying the production by capacity reports showed that those with a capacity of 100 to 250 tons per month did better than the smaller and larger foundries. These, with reports from 50 foundries, operated at 103.1 per cent during March. The largest foundries made the poorest showing. Those with a normal production of over 400 tons per month, 16 reporting, operated during March at a ratio of 86.3 per cent of normal.

Non-Ferrous Metal Markets

Copper Unchanged — Tin Active at New Low—Lead Quiet—Zinc Weaker

NEW YORK, N. Y., April 29.

Copper.—Disappointment prevails as to the amount of business done since the drop in price two weeks ago. Domestic buyers are apparently still on strike. One producer states that it has sold more in April than in March, but this may mean very little relatively. Another producer says that there is at present almost no domestic buying. The only encouraging feature is the fairly large sales for export. To date these have been over 42,000 gross tons, which is the largest for any month since September.

Reports are in circulation as to a further reduction in price. Apparently producers plan to hold the export price at 14.30c. as a test of the market, but there is a strong possibility of a break almost any time. Concessions in the present domestic price apply only to a few odd lots here and there. Electrolytic copper is quoted at 14c., delivered in the Connecticut Valley, with the price of Copper Exporters, Inc., at 14.30c., c.i.f. usual European ports. Lake copper is only moderately active at 14c. to 14.12½c., delivered. It is expected that statistics for April will again show an increase in stocks of refined metal.

Tin.—Straits tin sold today at a new low price since late in 1922. Today's quotation was 34.37½c., New York, for spot metal, the next lowest having been 34.12½c. on Oct. 13, 1922. Large supplies and small demand have been the causes. Stocks in London warehouses on Saturday, April 26, increased during the week 821 tons, bringing the total to 17,872 tons. The increase in the last three weeks has been 1719 tons. Straits shipments to April 25 have been very large at 9378 tons. Besides these large supplies, stocks here both on dock and in official warehouses have steadily increased. At the lower levels consumers here have been making fairly good-sized purchases for nearby and for as far ahead as December.

Because of the foregoing conditions, prices in London today are the lowest in many months, with spot standard quoted at £156 10s., future standard at £158 15s. and spot Straits at £158 12s. 6d., all about £8 per ton less than a week ago. The Singapore price today was £160 15s. The future standard price of £158 15s. compares with the

THE WEEK'S PRICES. CENTS PER POUND FOR EARLY DELIVERY

	Apr. 29	Apr. 28	Apr. 26	Apr. 25	Apr. 24	Apr. 23
Lake copper, New York.....	14.12½	14.12½	14.12½	14.12½	14.12½	14.12½
Electrolytic copper, N. Y.*.....	13.75	13.75	13.75	13.75	13.75	13.75
Straits tin, spot, N. Y.	34.37½	34.62½	34.75	34.87½	36.25	36.50
Zinc, East St. Louis.....	4.72½	4.72½	4.75	4.75	4.75	4.75
Zinc, New York.....	5.07½	5.07½	5.10	5.10	5.10	5.10
Lead, St. Louis.....	5.40	5.40	5.40	5.40	5.40	5.40
Lead, New York.....	5.50	5.50	5.50	5.50	5.50	5.50

*Refinery quotation; price ¼c. higher delivered in the Connecticut Valley.

Rolled Products

List Prices, Per Lb., f.o.b. Mill

On Copper and Brass Products, Freight up to 75c. per 100 Lb. Allowed on Shipments of 500 Lb. or Over

Sheets—	
High brass.....	20.50c.
Copper, hot rolled.....	23.75c.
Zinc.....	10.00c.
Lead (full sheets).....	8.25c.
Seamless Tubes—	
High brass.....	25.50c.
Copper.....	26.00c.
Rods—	
High brass.....	18.75c.
Naval brass.....	21.50c.
Wire—	
Copper.....	15.50c.
High brass.....	21.00c.
Copper in Rolls.....	22.75c.
Brazed Brass Tubing.....	23.00c.

Aluminum Products in Ton Lots

The carload freight rate is allowed to destinations east of Mississippi River and also to St. Louis on shipments to points west of that river.

Sheets, 0 to 10 gage, 3 to 30 in. wide.....	31.30c.
Tubes, base.....	42.00c.
Rolled rods in colls.....	31.00c.

Chicago Warehouse

(Prices Cover Trucking to Customers' Doors in City Limits)

Sheets—		Base per Lb.
High brass.....	20.50c.	
Copper, hot rolled.....	26.00c.	
Copper, cold rolled, 14 oz. and heavier.....	30.00c.	
Zinc.....	10.75c.	
Lead, wide.....	10.05c.	
Seamless Tubes—		
Brass.....	25.50c.	
Copper.....	26.00c.	
Brass Rods.....	18.75c.	
Brazed Brass Tubes.....	28.00c.	

New York or Cleveland Warehouse

Delivered Prices, Base per Lb.

High brass.....	20.50c.
Copper, hot rolled, base sizes.....	23.75c.
Copper, cold rolled, 14 oz. and heavier, base sizes.....	26.00c.
Seamless Tubes—	
Brass.....	25.50c.
Copper.....	26.00c.
Brass Rods.....	18.75c.
Brazed Brass Tubes.....	28.12½c.

New York Warehouse

Delivered Prices, Base per Lb.

Zinc sheets (No. 9), casks.....	10.25c. to 11.00c.
Zinc sheets, open.....	11.25c. to 11.75c.

Metals from New York Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	36.50c. to 37.50c.
Tin, bar.....	38.50c. to 39.50c.
Copper, Lake.....	15.50c.
Copper, electrolytic.....	15.25c.
Copper, casting.....	15.00c.
Zinc, slab.....	6.25c. to 7.25c.
Lead, American pig.....	6.50c. to 7.00c.
Lead, bar.....	8.00c. to 8.50c.
Antimony, Asiatic.....	10.25c. to 10.75c.
Aluminum No. 1 ingots for remelting (guaranteed over 99% pure).....	25.00c. to 26.00c.
Alum. ingots, No. 12 alloy.....	24.00c. to 25.00c.
Babbitt metal, commercial grade.....	25.00c. to 35.00c.
Solder, ½ and ½.....	24.50c. to 25.50c.

Metals from Cleveland Warehouse

Delivered Prices, Per Lb.

Tin, Straits pig.....	41.00c.
Tin, bar.....	43.00c.
Copper, Lake.....	15.50c.
Copper, electrolytic.....	15.25c.
Copper, casting.....	14.25c.
Zinc, slab.....	7.50c. to 7.75c.
Lead, American pig.....	6.38c. to 6.63c.
Lead, bar.....	8.75c.
Antimony, Asiatic.....	16.00c.
Babbitt metal, medium grade.....	17.50c.
Babbitt metal, high grade.....	43.25c.
Solder, ½ and ½.....	27.00c.

Old Metals, Per Lb., New York

Buying prices represent what large dealers are paying for miscellaneous lots from smaller accumulators and selling prices are those charged consumers after the metal has been properly prepared for their uses. (Until the market settles, prices are nominal.)

	Dealers' Buying Prices	Dealers' Selling Prices
Copper, hvy. crucible.....	11.25c.	12.50c.
Copper, hvy. and wire.....	11.00c.	12.00c.
Copper, light and bottoms.....	9.75c.	10.50c.
Brass, heavy.....	6.25c.	7.75c.
Brass, light.....	5.00c.	6.25c.
Hvy. machine composition.....	8.75c.	10.00c.
No. 1 yel. brass turnings.....	6.50c.	7.00c.
No. 1 red brass or compos. turnings.....	8.00c.	9.00c.
Lead, heavy.....	4.25c.	4.75c.
Lead, tea.....	3.00c.	3.50c.
Zinc.....	2.75c.	3.25c.
Sheet aluminum.....	9.00c.	11.50c.
Cast aluminum.....	8.00c.	10.50c.

recent low of £161 and with the so-called stabilized price of £250 per ton, aimed at some months ago by the London "group." At the low levels today the market here was very quiet.

Lead.—Demand is confined to carload and small lots for May delivery. Producers are not quoting on June metal. Prices are steady and unchanged at 5.40c., St. Louis, with the quotation of the leading interest at 5.50c., New York, as the contract price. World production in March was 5277 tons a day, practically unchanged from the previous month and about 100 tons higher than for March, 1929.

Zinc.—Prices for prime Western zinc are weaker. While most large producers adhere to 4.75c., East St. Louis, it is probable that a desirable order could be put through at 4.70c. or 4.72½c. for spot and early delivery. In the absence of any large demand, a test of the market is lacking. The quotable range is 4.70c. to 4.75c., East St. Louis, and the minimum figure is the lowest since April 15, 1922.

Ore is unchanged at \$35, Joplin, with output last week at 8600 tons. Sales were 10,900 tons and shipments 11,876 tons, the largest for any week

since late in February. Surplus stocks are estimated at 17,687 tons.

Antimony.—There is very little business and prices are weaker. Chinese metal is quoted at 7.60c. to 7.75c., duty paid, New York.

Nickel.—Wholesale lots of ingot nickel are quoted at 35c. a lb., with shot nickel at 36c. and electrolytic nickel in cathodes at 35c.

Aluminum.—Virgin metal, 98 to 99 per cent pure, is quoted at 23.90c., delivered, the published price.

Non-Ferrous Metals at Chicago

CHICAGO, April 29.—This market is quiet, with lower prices being quoted on tin and zinc. The old metal market is dull, with prices generally lower.

Prices per lb., in carload lots: Lake copper, 14.50c.; tin, 35.30c.; lead, 5.50c.; zinc, 4.85c.; in less-than-carload lots, antimony, 8.60c. On old metals we quote copper wire, crucible shapes and copper clips, 10c.; copper bottoms, 8.50c.; red brass, 8.50c.; yellow brass, 6c.; lead pipe, 4.25c.; zinc, 2c.; pewter, No. 1, 17.50c.; tin-foil, 20c.; block tin, 26.50c.; aluminum, 8.50c.; all being dealers' prices for less-than-carload lots.

MILWAUKEE, 1000 tons, building for Northwestern Mutual Life Insurance Co., to an unnamed bidder.

Reinforcing Bars Pending

Inquiries for reinforcing steel bars include the following:

WORCESTER, MASS., 230 tons, shoe plant. PITTSFIELD, MASS., 180 tons, telephone exchange.

EAST BOSTON, 117 tons, playground bleachers.

JERSEY CITY, N. J., 500 tons, connecting link joining route 25 with Holland vehicular tunnel; general contract awarded to Tunnel Construction Corporation, New York.

BROOKLYN, 360 tons, subway section 5, route 110, Rockaway Avenue; general contract awarded to Necaro Co., Inc., Brooklyn, instead of to another contractor, as reported last week.

ERIE, PA., 1600 tons, sewage disposal plant.

DES MOINES, IOWA, 100 tons, sewage disposal plant; Turner Construction Co., general contractor.

GALESBURG, ILL., 2300 tons, sewage disposal plant; new figures being taken.

CHICAGO, 600 tons, bridge approaches and supports on outer drive.

CHICAGO, 800 tons, apartment building for an unnamed owner.

CHICAGO, 1000 tons, Eddystone apartment building on Sheridan Road.

CHICAGO, tonnage being estimated, Lane Technical High School.

CHICAGO, 100 tons, Oriental Institute at University of Chicago.

CHICAGO, 450 tons, express terminal for Chicago & North Western Railroad.

CHICAGO, 450 tons, substation for Commonwealth Edison Co.; new figures being taken.

CHICAGO, 180 tons, warehouse for Wabash Railroad.

SAN FRANCISCO, 100 tons, paving Ocean Shore highway; bids May 20.

Railroad Equipment

Illinois Central Inquiries for 2265 Freight Cars

THE railroad equipment is more active this week than in some time, with inquiries for a total of 2360 freight cars, of which 2265 are for the Illinois Central. Orders placed total 175 cars and 800 steel underframes. Details follow:

Illinois Central has issued formal inquiry for 2265 freight cars as follows: 200 40-ton automobile cars, 650 50-ton automobile cars, 150 50-ton automobile cars, 500 70-ton hopper cars, 500 50-ton mill-type gondola cars, 200 50-ton flat cars, and 65 caboose cars. Bids are requested by May 19.

Central Railroad of New Jersey has ordered 25 passenger coaches and five passenger-baggage cars from Pressed Steel Car Co.

Erie has ordered five express cars from American Car & Foundry Co., and 25 caboose cars from Magor Car Corporation, and is inquiring for 50 70-ton gondola cars and 20 suburban coaches.

L. C. L. Corporation has ordered 100 steel gondola cars from Standard Steel Car Co.

Chicago & North Western is inquiring for 10 flat cars.

Western Electric Co. is inquiring for five to 15 flat cars.

Union Pacific has ordered 300 underframes from Bettendorf Co. for cars to be built in its own shops, and is in the market for 20 70-ton gondola cars.

Canadian Pacific has ordered 50 ore cars from Eastern Car Co.

Pacific Fruit Express has ordered 500 steel car underframes from Western Pipe & Steel Co.

Jones & Laughlin Profits Lower in First Quarter

The Jones & Laughlin Steel Corporation, Pittsburgh, had net income in the quarter ended March 31 of \$3,555,009, after deductions for depreciation and depletion reserves and bond interest, as compared with \$3,852,836 in the preceding quarter, and with \$5,254,179 in the first quarter of 1929. Dividends of 1¼ per cent on preferred stock, and 1¼ per cent on common were declared.

At the annual meeting of stockholders it was stated that the company authorized the expenditure of \$21,000,000 for plant improvements and expansion during 1929.

Sheet Tonnage Rates Drop

Tonnage rates for sheet and tin mill workers in mid-Western mills subscribing to the sliding scale wage agreement of the Amalgamated Association of Iron, Steel and Tin Workers decline 4½ per cent from the base rate for the May-June period, as a result of the bi-monthly settlement. The average selling price of Nos. 26, 27 and 28 gage black sheets shipped during the 60 days ended April 20 was 2.90c. a lb., as against 3.05c., the average two months before.

Reinforcing Steel

Awards of 5800 Tons—5500 Tons Added to Pending Work

REINFORCING steel awards at 5800 tons compare with 9500 tons in the preceding week. Lettings included 1500 tons for the West Street elevated highway in New York and 1000 tons for the Northwestern Life Insurance Building in Milwaukee. Pending projects total 5500 tons, with most of the activity in the Chicago district. Awards follow:

LACONIA, N. H., 300 tons, Scott & Williams Co. plant, to Bancroft & Martin Rolling Mill Co.

BELMONT, MASS., 125 tons, State hospital, to Joseph T. Ryerson & Son, Inc.

NEW HAVEN, CONN., 100 tons, New Haven Railroad bridge, to Concrete Steel Co.

NEW YORK, 1500 tons, West Street elevation, contract 5, section 1, division 1; 750 tons awarded to Joseph T. Ryerson & Son, Inc., and 750 tons placed with Day & Goater.

CENTRAL ISLIP, N. Y., 400 tons, State hospital, to Concrete Steel Co.

JERSEY CITY, N. J., 300 tons, coal pocket for Delaware, Lackawanna & Western Coal Co., to Kalman Steel Co.

PATERSON, N. J., 180 tons, State road work, to Igoo Brothers.

MONMOUTH AND MERCER COUNTIES, N. J., 500 tons, State road work, to Truscon Steel Co.

AKRON, OHIO, 220 tons, Y. M. C. A. building, to Pollak Steel Corporation.

CHICAGO, 100 tons, Oriental Institute at University of Chicago, to Inland Steel Co.

CHICAGO, 150 tons, store and office building, to Calumet Steel Co.

CHICAGO, 300 tons, additional for Michael Reese Hospital, to Inland Steel Co.

STATE OF ILLINOIS, 550 tons, road work; 150 tons to Concrete Engineering Co., 410 tons to an unnamed bidder.

Fabricated Structural Steel

Awards of 42,000 Tons Largest for Any Week Since February—30,000 Tons in New Projects

AS measured by structural steel awards of the past week, at 42,000 tons, building construction is beginning to register a fair seasonal increase. This total is the largest reported since the middle of February. A week ago 30,000 tons was reported, while 29,000 tons was the total two weeks ago and 33,000 tons three weeks ago.

Contracts included 6000 tons for an insurance building in Philadelphia, 11,000 tons for two subway sections in New York, 7000 tons for terminal buildings at Dayton, Ohio, while outstanding new projects are 5000 tons for a technical high school in Chicago, 2500 tons for an elevated highway at Syracuse, N. Y., 3000 tons for a bridge at Jacobs Creek, Pa., and 2500 tons for a mill building for Weirton Steel Co. Awards follow:

MEDUCTIC AND HILLSBORO, N. B., 1000 tons, bridges, to St. John Drydock & Shipbuilding Co., St. John, N. B.

MONROE, N. H., 300 tons, State bridge to American Bridge Co.

MIDDLETOWN, N. H., 140 tons, transmission towers, Rockland Light & Power Co., to New England Structural Co.

NEW YORK, 300 tons, Anthony Home, Lexington Avenue, to Hedden Iron Construction Co.

NEW YORK, 6000 tons, section 6, route 103, subway, to American Bridge Co.

NEW YORK, 5500 tons, section 5, route 110, subway, to McClintic-Marshall Co.

CENTRAL ISLIP, N. Y., 1000 tons, hospital buildings, to Allied Bronze & Ornamental Iron Corporation, New York.

STATE OF NEW JERSEY, 150 tons, highway bridges, to American Bridge Co.

PHILADELPHIA, 6000 tons, building for Penn Mutual Life Insurance Co., to Bethlehem Steel Co.

HERFORD AND TOWNSEND INLET, N. J., 1500 tons, toll bridges for Ocean Highway Bridge Co., to Bethlehem Steel Co.

MILWAUKEE, 6700 tons, Northwestern Mutual Life building, to McClintic-Marshall Co., previously reported to an unnamed bidder.

MILWAUKEE, 1200 tons, theater, to American Bridge Co.

PHILADELPHIA, 1600 tons, Thirtieth Street viaduct, to Bethlehem Steel Co.

WILMINGTON, DEL., 400 tons, building for Hercules Powder Co., to American Bridge Co.

SOUTHERN RAILWAY, 700 tons, bridge at Burnside, Ky., to Mount Vernon Bridge Co.

WEST CHESTER, PA., 200 tons, theater for Warner Brothers, to Pittsburgh Bridge & Iron Co.

NEW CASTLE, PA., 150 tons, bridge for Lawrence County, to Guilbert Steel Co.

ATLANTA, GA., 700 tons, transmission towers and substations for Georgia Power Co., to Nashville Bridge Co.

BUFFALO, 100 tons, Delward store and office building, to Kellogg Structural Steel Co.

DAYTON, OHIO, 7000 tons, buildings for Dayton Terminal Co., to American Bridge Co.

MICHIGAN CITY, MICH., 200 tons, walkways for Michigan City Generating Co., to Vierling Steel Works, Chicago.

BAY CITY AND MOUNT PLEASANT, MICH., 2200 tons, oil storage tanks for Pure Oil Co., to Warren City Tank & Boiler Co.

MANISTIQUE, MICH., 500 tons, building for Inland Stone Co., to Worden-Allen Co.

LUCAS COUNTY, OHIO, 325 tons, three highway bridges, to American Bridge Co.

CHICAGO, 210 tons, highway spans, to Vierling Steel Works, Chicago.

CHICAGO, 100 tons, substation work for Commonwealth Edison Co., to Vierling Steel Works.

CHICAGO, 4100 tons, addition to Morrison Hotel, to American Bridge Co.

GRANITE CITY, ILL., 200 tons, Union Starch & Refining Co., factory, to Chester Iron & Foundry Co.

MADISON, WIS., 560 tons, engineering building for University of Wisconsin, to McClintic-Marshall Co.

LOS ANGELES, 500 tons, plates, additional gas holders for Southern Counties Gas Co., to Western Pipe & Steel Co.

LOS ANGELES, 100 tons, hangar No. 3, to McClintic-Marshall Co.

LOS ANGELES, 450 tons, gymnasium for University of Southern California, to Consolidated Steel Corporation.

SAN FRANCISCO, 100 tons, substation for Pacific Gas & Electric Co., to Pacific Coast Engineering Co.

SAN FRANCISCO, 250 tons, 1004 ladders for Pacific Fruit Express Co., to Pacific Coast Engineering Co.

Structural Projects Pending

Inquiries for fabricated steel work include the following:

NEW YORK, 200 tons, addition to library, Metropolitan Museum of Art.

NEW YORK, 800 tons, subway stations at Fifty-third and Thirteenth Streets for Board of Transportation.

ASTORIA, N. Y., 500 tons, theater and stores on Steinway Avenue.

NEW YORK, 1100 tons, substructure of Pier 34 at Spring Street.

NEW YORK, 1000 tons, office building at 101 Wall Street.

NEW YORK CENTRAL RAILROAD, 2500 tons for track elevation work in western Ohio.

JAMAICA, N. Y., 200 tons, building for Bank of United States.

NEW YORK CENTRAL RAILROAD, 2500 tons, elevated highway over tracks at Syracuse, N. Y.

BALTIMORE, 900 tons, freight building for Baltimore & Ohio Railroad.

LOUISVILLE, KY., unstated tonnage, building for Southern Bell Telephone Co.

WEIRTON, W. VA., 2500 tons, mill building for Weirton Steel Co.

JACOBS CREEK, PA., 3000 tons, Youghiogheny River bridge.

PHILADELPHIA, 100 tons, construction at Fifty-sixth Street under Reading Railroad tracks.

STATE OF PENNSYLVANIA, 150 tons, highway bridges.

BERWYN, PA., 100 tons, Berwyn National Bank building.

TRENTON, N. J., 200 tons, Soldiers and Sailors Memorial Building.

DELAWARE CITY, DEL., 400 tons, sheet piling for canal improvement.

CHICAGO, 5000 tons, Lane Technical High School.

CHICAGO, estimates soon to be made, bascule bridge for outer drive.

CHICAGO, 1100 tons, substation for Commonwealth Edison Co.

STATE OF IOWA, 550 tons, highway bridges.

MANITOWOC, WIS., 125 tons, State highway bridges; bids close May 7.

SHERBOGAN, WIS., 750 tons, power house for Wisconsin Power & Light Co.

RACINE, WIS., 400 tons, revised figures being asked on City Hall.

OTTAWA, ONT., 1500 tons, Bank of Montreal building.

UNION PACIFIC, 300 tons, bridges, this is in addition to tonnage asked for last week.

ILLINOIS CENTRAL, 100 tons, bridges.

CHICAGO & NORTH WESTERN, 3600 tons, 1930 bridge requirements.

SOUTHERN PACIFIC, 700 tons, subway at Tucson, Ariz.

SALT LAKE CITY, UTAH, 1000 tons, building.

FRISCO LINES, 800 tons, bridges in Arkansas and Oklahoma.

OAKLAND, CAL., 150 tons, plates, 20-in. shore pipe for Port Commission; Pacific Coast Engineering Co., low bidder.

SACRAMENTO, 375 tons, bridge over Mojave River; bids opened.

Detroit Scrap Weak

DETROIT, April 29.—Weakness has developed in the scrap market, with reductions on a number of items. Blast furnace material has not been affected.

Production schedules for May are about on the same basis as those of this month, but there may be some increases among the larger producers.

Dealers' buying prices per gross ton, f.o.b. cars, Detroit:

Hvy. melting and shov.	
steel	\$11.50 to \$12.00
Borings and short turnings	8.00 to 8.50
Long turnings	7.00 to 7.50
No. 1 machinery cast	10.50 to 11.00
Automotive cast	12.00 to 12.50
Hydraulic comp. sheets	11.25 to 11.75
Stove plate	9.00 to 9.50
New No. 1 busheling	10.25 to 10.75
Old No. 1 busheling	8.75 to 9.25
Sheet clippings	8.50 to 9.00
Flashings	10.00 to 10.50

Castings That Withstand Heat and Corrosion

(Concluded from page 1280)

Mention was made above of the fact that there are probably 35 foundries in this country at the present time which are producing chromium-iron and chromium-nickel castings. Some of these foundries are making nothing else. In other cases, steel foundries are making these castings as a side line, perhaps not always realizing the highly specialized nature of the business. The potential production is far in excess of the present demand. This condition, as usual, has brought about a scramble for business which has not helped the industry. However, new uses are being found for the alloys and the field of application for them is being constantly widened. The industry is young and must suffer the pains natural to growth, but its future importance is assured.

The General Electric Co. has announced, effective immediately, price reductions of from 3 to 5 per cent, covering various standard lines of electric apparatus. These reductions were made as a reflection of the recent recession in the price of copper.

New Indian Buying Law Will Aid Europe

Requires Purchase From Native Dealers—Continent Books New

Indian Contracts—Japan to Roll First Sheet Piling in October

(By Cable)

LONDON, ENGLAND, April 28.

THE German Hannoversche Maschinenbau has secured 16 locomotives to cost £65,000 (\$316,290), the Friedrich Krupp A. G. has secured large quantities of wheels and axles and Henschel & Co. have been awarded 17 locomotives by the India Stores Department. India has also placed orders for 88 boilers and 66 cylinders valued at £116,000 (\$563,760) with Hungarian works.

The German steel output in March was 1,021,000 metric tons. Luxembourg produced 245,000 metric tons of pig iron, and 225,000 tons of raw steel with 35 blast furnaces active at the end of March. Saar output in March was 182,000 metric tons of pig iron and 188,000 tons of raw steel.

The South African Iron & Steel Corporation is acquiring a controlling interest in the Union Steel Corporation of South Africa.

Iron and steel business is quiet since resumption after the Easter holidays and the outlook is not favorable. Pig iron makers are seeking orders, but declining to grant further concessions in price on Cleveland and Midlands iron.

Hematite is weaker as producers and merchants are seeking to clear stocks, and prices are now well below cost. Finished steel is dull and heavy mills are seeking orders. The Clyde Bridge Works has stopped its plate mills and is only operating four smelting furnaces. Stewarts & Lloyds, Ltd., Birmingham, has closed its Phoenix plant and is operating the Clydesdale works five days a week.

The Continental market here is

In Germany Cotton Tie Exporters to Distribute Through Own Organization.

* * *

In India New Buying Policy of Government Brings Business to Germany and New Law Requiring Purchase Through Native Companies Will Increase It.

* * *

In Japan the First Sheet Piling Will Be Rolled in October. Can Maker Plans To Produce Own Tin Plate.

quiet with Continental mills seeking orders unsuccessfully and further curtailing their output.

Tin plate business is brisk as a result of continually expanding demand from consumers. Tin plate has been sold for June, July, August and later delivery, and makers are well engaged. The outlook is considered decidedly favorable, as consumption here and abroad is expanding. Galvanized and black sheets are quiet.

German Cartel Ends When American Plant Is Built

HAMBURG, GERMANY, April 14.—Establishment of a plant for the manufacture of sanitary equipment at Neuss am Rhein by the Standard Sanitary Mfg. Co., Pittsburgh, has

been followed by dissolution of the German Bath Tub Syndicate. The American company was unwilling to become a member of the syndicate, so that price control was no longer possible. The plant at Neuss am Rhein will be one of the largest in Europe. Keen competition for continental and overseas business is expected, as Germany has been supplying about two-thirds of the total European export trade in this field.

Japan's Sheet Imports Decline Further

WASHINGTON, April 24.—Imports of light-gage sheets into Japan in 1929 totaled only 82,284 metric tons, a sharp decline from the 189,394 tons in the previous year, 183,265 tons in 1927 and 346,862 tons in 1924, says a report from Tokio to the Department of Commerce. Sheets in these totals are less than 0.7 mm. (No. 23 gage) in thickness. Supplying countries for the 1929 shipments were Great Britain, 47,879 tons; Germany, 18,303 tons, and the United States, 15,371 tons.

New Indian Buying Methods Aid European Sellers

HAMBURG, GERMANY, April 14.—The Indian Government's new policy of buying material and equipment in the lowest market has diverted business from Great Britain to Continental producers. Recently the India Stores Department contracted with the Hannoversche Waggonfabrik to furnish 16 locomotives, to cost £65,367

British and Continental European Export Prices per gross ton, f.o.b. United Kingdom Ports, Hamburg and Antwerp, with the £ at \$4.8665 (par)

British Prices f.o.b. United Kingdom Ports

Ferromanganese, export.	£10 15s.	to £11 15s.	\$52.30 to \$57.17
Billets, open-hearth....	6 0	to 6 10	29.20 to 31.63
Black sheets, Japanese specifications	12 5		59.61
Tin plate, per base box..	0 18½	to 0 18½	4.46 to 4.50
Steel bars, open-hearth...	8 0	to 8 10	1.74 to 1.85
Beams, open-hearth....	7 7½	to 7 17½	1.60 to 1.71
Channels, open-hearth...	7 12½	to 8 12½	1.66 to 1.87
Angles, open-hearth....	7 7½	to 7 17½	1.60 to 1.71
Black sheets, No. 24 gage	9 15	to 10 0	2.12 to 2.17
Galvanized sheets, No. 24 gage	11 17½	to 12 5	2.57 to 2.60

Continental Prices, f.o.b. Antwerp or Hamburg

Foundry iron, 2.50 to 3.00 per cent sil., 1.00 per cent and more phos.	£3 2½s. to £3 3½s.	\$15.21 to \$15.45
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Billets, Thomas	4 13	to 4 14	22.63 to 22.87
Wire rods, low C., No. 5 B.W.G.	6 2	to 6 4	29.69 to 30.19
Rails, light	6 0		29.20
Black sheets, No. 31 gage, Japanese.....	11 5	to 12 12	54.68 to 58.32
Steel bars, merchant....	5 7½		1.18
Steel bars, deformed....	5 6½	to 5 7½	1.17 to 1.18
Beams, Thomas, British standard	5 1	to 5 2½	1.11 to 1.14
Channels, Thomas, American sections	5 12	to 5 14	1.24 to 1.26
Angles, Thomas, 4-in. and larger, over ¾-in. thick	5 6		1.17
Angles, Thomas, 3-in....	5 7½		1.18
Hoop and strip steel over 6-in. base	5 15		1.27
Wire, plain, No. 8 gage..	6 9		1.41
Wire, barbed, 4-pt. No. 12 B.W.G.	10 10		2.28
Wire nails, base.....	6 12½		\$1.44 a keg

(\$318,075), and with the Friedrich Krupp A. G. and the Henschel A. G., to furnish locomotive boilers and tires, to cost £32,700 (\$159,118). After Jan. 1, 1931, when the rupee tender system becomes effective, under which the government must buy in rupees through Indian companies, which are largely agents of Continental and other foreign producers, a still larger volume of business is expected to go to German and other Continental companies.

Belgium Large Seller of Wire to Brazil

WASHINGTON, April 24.—Imports of barbed wire into Brazil in 1929 totaled 38,958 metric tons, of which the United States is estimated to have furnished one-third to two-fifths, according to a report to the Department of Commerce. Belgium is reported to have been the chief supplying country. Imports of other wire in 1929 totaled 38,818 tons, of which the American share was about 5 per cent of the total, the chief sources of supply being Germany and Belgium.

Mining of Turkish Chrome Ore Under Way Soon

CONSTANTINOPLE, TURKEY, April 5.—Mining of the rich chromium ore deposits near Adalia in southern Anatolia is expected to get under way soon. Much of the ore contains up to 60.9 per cent chromium. Most of the properties have been acquired by the Baschtasch A. G., Swedish controlled, the Friedrich Krupp A. G., Germany, the Sir Edmond Davis Co. in England and a Dutch interest. Shipments from the mines will begin as soon as a railroad, now under construction to a port, is completed.

Japanese Can Company May Make Tin Plate

YOKOHAMA, JAPAN, March 22.—Tin plate is one of the few metal products production of which has not been considerably increased by Japanese mills in the past few years. The Seitetsu Jo (Imperial Steel Works) has had difficulty in turning out 20,000 tons of tin plate annually. Recently the Oriental Can Mfg. Co. has investigated the possibility of making tin plate, with the technical advice of the Imperial Steel Works. The latter is also understood to have arranged to provide an engineer experienced in tin plate production to manage the plant, should the Oriental Can Mfg. Co. decide to build. The mill would be supplied with steel from the Imperial Steel Works, and it is expected that construction will begin so that the first tin plate will be made early next year.

It is noteworthy that Japan is one of the leading tin plate customers of both the United States and Great

Britain. Of total exports of 164,978 metric tons of tin plate from the United Kingdom in 1929, 31,653 metric tons was taken by Japan, exceeded only by Italy's 33,157 tons. The United States exported 157,570 metric tons, of which Japan received 61,814 tons and Canada, 46,213 tons.

German Machinery Makers Report Better Exports

HAMBURG, GERMANY, April 14.—Operations of members of the Federation of German Machinery Manufacturers averaged 61.5 per cent in the first quarter of this year, compared with 63.5 per cent in the last quarter of 1929. The federation reports a decline in orders from domestic buyers, but this has been partly offset by an improvement in certain branches of export.

Germans Plan Cotton Tie Selling Company

HAMBURG, GERMANY, April 14.—An effort is being made by German exporters to establish a central selling organization to sell cotton ties direct to cotton growers in the United States, Egypt, India, East Africa and other markets. A survey of buying methods has shown that the consumer seldom obtains his supplies directly from the producer, but buys through dealers and brokers, who have received the ties from exporters.

Foreign Commerce Handbook

The Foreign Commerce Handbook, published every two years by the foreign commerce department, Chamber of Commerce of the United States, Washington, is now available for 1930-1931. Alphabetically arranged, the handbook gives the names of sources of information on all branches of foreign trade. A few of the titles under which sources are classified are acceptances, advertising, agencies, banks, cables, catalogs, credit information, definitions in foreign trade, customs tariffs, forwarders, packing, trade lists and trademarks.

British Metallurgists' Trip to America in 1932

Plans for an American meeting of metallurgists, to be held by the Institute of Metals in the United States and Canada two years hence, are taking definite shape. The reception committee of the institute's hosts in the United States—the American Institute of Mining and Metallurgical Engineers—has prepared such an attractive draft program that nearly 100 British members have already booked for the trip.

The visit will include official meetings of the institute in New York and joint meetings with allied societies in Detroit and Toronto. Other places to be visited include Pittsburgh, Cleveland, Chicago, Niagara Falls and Montreal. In all of these, plants will be thrown open for inspection.

The party is expected to leave Southampton on Sept. 3, 1932. The meeting in New York will begin on Sept. 11, and the return journey will start from Montreal on Sept. 30.

Four New Ships Will Take 50,000 Tons of Steel

WASHINGTON, April 29.—Approximately 50,000 tons of steel will be required for four ships aggregating 130,000 gross tons which will be built in American yards for the United States Lines, Inc., as the result of three mail contracts signed last week by Postmaster General Brown. Two of the vessels are to be of not less than 45,000 tons each and capable of maintaining a speed of 28 knots and will operate between New York and Southampton, England. They are to be built within 10 years. Two other vessels of 20,000 tons each are to be constructed within five years and will operate between New York and London and New York and Plymouth.

Chesapeake & Ohio Railroad has announced plans to construct a large freight terminal in Cincinnati to cover a complete city block. The project will entail an estimated expenditure of \$2,000,000. Contracts have been awarded to the Cleveland Wrecking Co. to raze 135 buildings to make way for the new terminal.

Iron and Steel Production in Canada (a)

(In Gross Tons)

	March, 1930	February, 1930	March, 1929
Pig iron.....	72,582	70,600	86,176
do., three months.....	230,261	.....	267,879
do., basic, three months.....	157,394	.....	212,088
do., foundry, three months.....	49,955	.....	45,961
do., malleable, three months.....	22,912	.....	9,830
Ferroalloys.....	5,279	4,821	5,972
do., three months.....	17,043	.....	18,237
Steel ingots.....	109,675	99,964	137,158 (b)
do., three months.....	318,283	.....	354,362
Steel castings.....	7,812	6,648	(b)
do., three months.....	21,016	.....	16,501
Total steel, three months.....	339,299	.....	370,863

(a) Dominion Bureau of Statistics, Ottawa.

(b) Ingots and castings together were 137,158 tons.

Machinery Markets and News of the Works

Large Buying at Chicago

Majestic Household Utilities Corporation Places Orders for Refrigerator Plant

THE Majestic Household Utilities Corporation, Chicago, a subsidiary of the Grigsby-Grunow Co., manufacturer of Majestic radio receiving sets, has placed large machine tool orders for the equipping of a plant to manufacture electric refrigerators. The program of the Majestic company is said to total about \$2,000,000. Orders of the past week aggregated several hundred thousand dollars. One company received a contract for \$200,000 worth of grinders, and another company's order was for only a slightly lesser amount.

Activity in machine tools is most impressive in the Chicago district, although there has been improvement elsewhere, notably at Cleveland and Cincinnati, while New England reports a sharp gain in the demand for used tools.

Chicago business included, in addition

to the Majestic Household Utilities Corporation's orders, heavy purchases of tools for the Nash Motors Co.'s Milwaukee plant, and the closing of lists by the Santa Fe and Milwaukee railroads.

The Nash Motors Co. is expected to buy soon for its Racine, Wis., plant; the Caterpillar Tractor Co., Peoria, Ill., contemplates issuing a list, and other prospective purchasers are the Allis-Chalmers Mfg. Co., Milwaukee, and the A. O. Smith Corporation, Milwaukee.

The General Electric Co. has bought a small lot of machines for its Radio-tron plant at Harrison, N. J. The Republic Steel Corporation is placing orders for several machines for its maintenance departments.

Business of the past week indicated that April buying, as a whole, may show a gain over that of March.

New York

NEW YORK, April 29.—Some machine sellers in this market report that orders were slightly better in the past week than in preceding weeks of the month. Orders are said to be better in the New England and Buffalo territories than in the district closer to New York. The New York Central Railroad has a large program of machine tool buying for the year, but probably will scatter purchases over many months.

General Cable Co., 420 Lexington Avenue, New York, has awarded general contract to United Engineers & Constructors, 80 Park Place, Newark, and 112 North Broad Street, Philadelphia, for one and two-story addition to plant of subsidiary, Standard Underground Cable Co., Perth Amboy, N. J., to cost over \$300,000 with equipment. Company is said to be planning another addition to same plant for production of rubber-covered cable, etc., to cost about \$150,000 with equipment. R. M. Fraser is company engineer.

Trout Mining Co., operated by Manhattan Electrical Supply Co., Inc., 15 Park Place, New York, has acquired manganese property near present lands

at Philipsburg, Mont., and plans early construction of new milling plant, to cost over \$300,000 with machinery. Richard H. Brown is president of parent organization.

K. C. K. Garage, Inc., New York, has leased building at 520-530 West 135th Street, for new service, repair and garage building.

Bell Telephone Laboratories, Inc., 463 West Street, New York, manufacturer of experimental telephone and radio equipment, has plans for a multi-story addition, to cost over \$400,000. Voorhees, Gmelin & Walker, 101 Park Avenue, are architects.

General Electric Co., Schenectady, N. Y., has awarded general contract to Becker Construction Co., 361 Grove Street, Newark, for one-story addition to plant at Bloomfield, N. J., 44 x 132 ft., to cost close to \$40,000 with equipment. It will be used primarily as motor winding department. Company will also build one-story substation for works service.

Brooklyn Edison Co., 380 Pearl Street, Brooklyn, will expand steam-operated electric generating plant on Hudson Avenue, including installation of two new turbo-generating units, boilers, condensers and auxiliary equipment to increase

output by 320,000 kw., to cost over \$10,000,000. Company is operated by Consolidated Gas Co., 4 Irving Place, New York, which has approved plans for enlargement of gas generating stations at Hunts Point, to cost about \$6,000,000; new battery of 37 gas coke ovens will be built.

General Ice Cream Co., 710 Eastern Avenue, Schenectady, N. Y., has asked bids on general contract for three-story addition to automobile service, repair and garage building, and storage and distributing plant, to cost over \$100,000 with equipment. W. E. Clark, Cannon Building, Troy, N. Y., is architect.

Cohn Brothers, 361 Stone Avenue, Brooklyn, architects, have plans for a two-story automobile service, repair and garage building, 100 x 100 ft., to cost over \$100,000 with equipment.

Wallace & Tiernan Co., Main and Mill Streets, Belleville, N. J., manufacturer of chlorine control machinery, water purification apparatus, etc., has asked bids on general contract for four-story addition, to cost about \$200,000 with equipment. Fletcher-Thompson, Inc., 31 Fulton Street, Newark, and 542 Fairfield Avenue, Bridgeport, Conn., is architect and engineer.

Board of Education, 31 Green Street, Newark, R. D. Argue, secretary, will receive bids until May 7 for machine shop and woodworking machinery, work benches, steel lockers and cabinets, sharpening tools, iron and steel, etc., as per list and specifications on file.

Board of Education, Perth Amboy, N. J., will install manual training shops in addition to high school, for which superstructure will soon be placed under way, entire unit to cost over \$200,000. General contract has been let to Perth Amboy Construction Co., 61 Madison Avenue.

Village Council, Ridgewood, N. J., has asked bids on general contract for one-story municipal automobile service, repair and garage building, 100 x 175 ft., to cost over \$80,000 with equipment. R. A. Harcom is engineer.

Pennsylvania Dock & Warehouse Co., 25 Church Street, New York, affiliated with Pennsylvania Railroad Co., Pennsylvania Terminal, will install elevating, conveying and other mechanical-handling equipment in new eight-story warehouse unit near Exchange Place, Jersey City, N. J., to cost over \$1,100,000. Terminal Development Co., 25 Church Street, New York, is architect and engineer.

M. & M. Machine & Boller Co., Perth Amboy, N. J., is operating at former machine shop of Patrick White & Sons, 339 Water Street; another portion of plant, including iron foundry, has been taken over by General Bakelite Co., Perth Amboy, manufacturer of molded insulation products, for storage and distribution. Patrick White organization will continue offices at same location. General Bakelite Co. will soon begin superstructure for three-story addition to factory on Grove Street, Bloomfield, N. J., 50 x 145 ft., to cost over \$100,000 with equip-

ment. Headquarters are at 247 Park Avenue, New York.

August P. Munning, referred to in a recent item in THE IRON AGE as one of incorporators of Munning & Munning, Inc., 5445 Rising Sun Avenue, Philadelphia, is not A. P. Munning who was until recently chairman of board of directors of Hanson-Van Winkle-Munning Co., Matawan, N. J., but is a nephew. Former chairman of Hanson-Van Winkle-Munning Co., THE IRON AGE is informed, has definitely retired from business and is now traveling in Europe.

Scandia Mfg. Co., Inc., 101 Mechanic Street, Newark, N. J., manufacturer of textile machinery, is moving to its new plant on Belleville Pike, North Arlington, N. J.

Kneuer Tall Board Co., Inc., manufacturer of patented spaceless tailboard hardware for motor trucks, has moved to its new plant at 127-129 Van Buren Street, Newark.

Keystone Foundry Co., at Essex Street and Stanley, Linwood and Wortman Avenues, Brooklyn, has changed its name to United States Tube & Foundry Co., Inc., because of addition of new products to its original foundry items.

New England

BOSTON, April 28.—The first encouragement in machine tool buying noted in many weeks is found in the used tool market. While business in this class of equipment is by no means brisk, more lathes, drill presses, punches, hack saws, etc., were sold the past week than in the previous three weeks combined. There is also a decided betterment in sales of bench equipment, both old and new. New tool dealers are not lacking in prospects, but with some large New England companies considering a temporary five-day week schedule, and part time for employees at the reduced hours, executives are indisposed to invest in equipment, much as it may be needed. One local house the past week sold four 6-in. pipe machines to a Massachusetts plant, the largest sale reported. The Pneumatic Drop Hammer Co. sold a 900-lb. hammer to a Connecticut company and a 500-lb. hammer to a Mansfield, Ohio, plant, and has prospective contract for several hammers from a Middle-West household equipment manufacturer.

Small tools are not in active demand. One large small tool house estimates its April sales will be at least 50 per cent smaller than those for the corresponding month last year.

Blowers and air washers are required for a high school at Providence, R. I., to cost \$1,300,000 with equipment.

Town of Milton, Mass., has plans for an administration building to contain metal working shops. Details have not yet been announced.

Martin Trailer Co., Westfield, Mass., has plans for a one-story manufacturing plant, 80 x 100 ft., to cost \$40,000 without equipment.

Providence Journal Co., Providence, R. I., has plans for a publishing plant for which motors and belt conveying equipment are under consideration.

Lux Clock Mfg. Co., Waterbury, Conn., has plans for a three-story and basement addition, to cost \$50,000 without equipment.

Board of Trustees, Harvard Medical School, Harvard University, Cambridge, Mass., has awarded general contract to Turner Construction Co., 178 Tremont Street, Boston, for power plant, 62 x 74 ft., with L-extension 20 x 34 ft., at Brighton, to cost over \$50,000 with equipment. Densmore, LeClear & Robbins, 31 St. James Avenue, Boston, are architects.

Hain Brothers, Meadow Street, Norwalk, Conn., have rejected bids recently received for one-story ice-manufacturing plant, 50 x 150 ft., and will have revised plans drawn at once, to cost about \$50,000 with equipment. H. E. Koerner, 83 Fairfield Avenue, Bridgeport, Conn., is architect.

Crawford Oven Co., New Haven, Conn., has awarded general contract to Larkin-Carey Co., 166 Brewery Street, for one-story factory, 90 x 200 ft., to cost over \$75,000 with equipment. Lockwood Greene Engineers, Inc., 100 East Forty-second Street, New York, is architect and engineer.

Central Scientific Co., 456-80 East Ohio Street, Chicago, manufacturer of chemical and physical testing equipment, balances, etc., has acquired L. E. Knott Apparatus Co., 79 Amherst Street, Cambridge, Mass., manufacturer of kindred equipment, and will consolidate. Knott company will continue at present location and will be known as Eastern Division of Central Scientific Co.

Curtis-Wright Flying Service, 27 West Fifty-seventh Street, New York, has plans for airplane hangar with repair and reconditioning facilities, 81 x 101 ft., on airfield, Rockland, Me. Capt. William Wincapaw is local manager.

Buffalo

BUFFALO, April 28.—du Pont Cellophane Co., River Road, Buffalo, manufacturer of transparent paper specialties, etc., a subsidiary of E. I. du Pont de Nemours & Co., Wilmington, Del., has approved plans for first unit of new plant at Amptill, near Richmond, Va., to cost about \$4,000,000 with machinery, scheduled for service early next year. On or before that time it is expected to begin work on second similar unit to cost close to like sum. Company has awarded general contract to Virginia Bridge & Iron Co., Roanoke, Va., for addition to mill at Old Hickory, Tenn., to cost over \$2,000,000 with equipment. Both projects will be carried out under direction of du Pont Engineering Co., du Pont Building, Wilmington, an allied interest.

Fetter Steel Barrel Corporation, 36 Lansing Street, Buffalo, manufacturer of steel barrels, drums, etc., has taken out a permit for one-story plant, to cost about \$40,000 with equipment.

Board of Education, Jamestown, N. Y., plans installation of manual training department in new three-story South Side high school, to cost \$700,000, for which plans are being completed by Oliver J. Johnson, Fenton Building, architect.

Unit Electric Tool Co., Inc., Syracuse, N. Y., care of Gerald G. True, 431 Union Building, recently organized by Mr. True and others with capital of \$50,000, plans operation of local plant to manufacture electric and mechanical tools and appliances.

Walter B. Kerr, 207 Sedgwick Drive, Syracuse, N. Y., has organized W. B. Kerr Corporation, to operate local plant for manufacture of machinery for decorating chinaware, etc., with capital of \$100,000. H. Duane Bruce, 410 Sedgwick Drive, is interested in new organization.

Federal Press Co., Elkhart, has appointed Homer Strong & Co., Inc., Buffalo and Rochester, N. Y., as sales representatives in western New York.

South Atlantic

BALTIMORE, April 28.—Ditch, Bow-ers & Taylor, Inc., Mount Royal and North Avenues, Baltimore, operating an automobile service and repair works, with electric and carburetor departments, etc., has awarded general contract to Charles Stockhausen Co., Inc., Gay and Water Streets, for rebuilding three-story plant recently destroyed by fire, with loss of about \$125,000 including equipment.

Crown Cork & Seal Co., 1511 Guilford Avenue, Baltimore, manufacturer of metal bottle seals, bottle-sealing machinery, parts, etc., will increase capital from 275,000 to 400,000 shares of stock, no par value, part of fund to be used for expansion.

City Council, Hopewell, Va., has awarded contract to Karlstrommer Construction Co., Hopewell, for hangar at municipal airport, with repair and reconditioning facilities, to cost over \$30,000.

In accordance with appropriation bill for extensions and improvements at navy yards, totaling \$10,000,000, Bureau of Yards and Docks, Washington, has been authorized to arrange for following work: San Diego, Cal., metal aircraft structures shop, \$130,000, seven aircraft hangars with repair facilities, \$275,000, and welfare building, \$150,000; accessories and crane at pier 6, Puget Sound Navy Yard, Seattle, \$1,310,000, equipment house, \$100,000, and paint and oil storage and distributing building, \$125,000; hangar at naval air station, Pearl Harbor, Hawaii, \$224,000 with equipment, and torpedo storage and charging plant, \$25,000; shop for aircraft repairs and overhauling at naval air station, Coco Solo, Canal Zone, \$90,000; battery storage, repair and overhauling building at Mare Island Navy Yard, San Francisco, \$240,000; gas cell house and storage building at Lakehurst, N. J., \$200,000.

United States Rubber Co., Broadway and Fifty-eighth Street, New York, is planning expansion for tire cord production at Winnsboro, S. C., to cost about \$200,000 with equipment.

Joseph Evans Sperry, Calvert Building, Baltimore, architect, will soon take bids on general contract for multi-story automobile service, repair and garage building, to cost about \$200,000 with equipment.

Atlantic Lime Rock Co., Sandersville, Ga., is carrying out expansion at quarry for crushed rock and stone for road-building, to include installation of a steam shovel, crushing plant, dragline equipment, dump cars and other conveying apparatus.

United Shank & Findings Co., Whitman, Mass., a subsidiary of United Shoe Machinery Co., Boston, has awarded general contract to T. R. Worrell, 101 East Fortieth Street, Savannah, Ga., for new plant on site recently acquired at Savannah for manufacture of shoe shanks, etc., to cost about \$100,000 with machinery.

Board of Trustees, Virginia Military Institute, Lexington, Va., is planning call for bids on general contract early in May for new engineering building, to cost about \$150,000 with equipment. Carneal, Johnson & Wright, Electric Building, Richmond, Va., are architects.

City Gas Co., 208 East Plume Street, Norfolk, Va., is planning extensions and improvements in artificial gas plant and system, to cost about \$50,000 with equipment.

Philadelphia

PHILADELPHIA, April 28.—Morris Wheeler & Co., Roberts Avenue, Philadelphia, iron and steel products, has awarded general contract to McCormick, Lenhan Co., Fortieth and Chestnut Streets, for new building to cost \$60,000. Julian J. Simsohn, Broad Street and Girard Avenue, is architect.

Department of Supplies and Purchases, City Hall Annex, Philadelphia, Jay Lit, director, is asking bids until May 5 for transits, compressor units, rubber-covered copper cable, and other equipment.

Barrett Co., 300 Grays Ferry Avenue, Philadelphia, will soon take bids on revised plans for three-story addition to roofing manufacturing plant, including improvements in present building, to cost about \$100,000 with equipment.

David Polnoroff, Philadelphia, has leased space in building at 1818 Ridge Avenue, to manufacture automobile fenders and other sheet metal products.

Horace W. Castor, Stephen Girard Building, Philadelphia, architect, has asked bids on revised plans for a one and two-story automobile service, repair and garage building, 60 x 178 ft., at Wayne-Radnor Township, to cost about \$100,000 with equipment.

Board of Public Education, Keystone Building, Philadelphia, will receive bids until May 6 for metal flag poles, gaskets, electrical materials and other supplies. Edward Merchant is secretary and business manager.

Klein Stove Co., Trenton Avenue and Tioga Street, Philadelphia, has leased 20,000 sq. ft. in building at Erie Avenue and Sepviva Street for expansion.

Neldich Process Co., St. Mary Street, Burlington, N. J., manufacturer of processed paper goods, etc., has asked bids on general contract for three-story and basement addition, 60 x 128 ft., including improvements in present factory, to cost about \$90,000 with equipment. Lockwood Greene Engineers, Inc., 100 East Forty-second Street, New York, is engineer.

Easton Airport Corporation, Easton, Pa., is considering establishment of airport, with hangars, repair shop and other field units, to cost over \$100,000 with equipment.

William L. Kaufhold, 530 North Plum Street, Lancaster, Pa., and associates have organized Manor Metalcraft Corporation, Columbia, Pa., with capital of \$50,000, to operate a local plant for manufacture of metal goods. John F. Horting, Lancaster, is interested in new organization.

Board of Education, Swarthmore, Pa., is asking bids on general contract until May 6 for a vocational shop building. Ritter & Shay, Packard Building, are architects.

Receivers for Harrisburg Mfg. & Boiler Co., Eighteenth and Nineteenth Streets, Harrisburg, Pa., will offer plant and property of company at public auction late in May. Senator William H. Earnest and Roy H. Stetler have been acting as receivers since Nov. 30. Property has been appraised at \$645,184.

Board of Education, Chambersburg, Pa., plans installation of manual training equipment in new three-story senior

The Crane Market

NEW business in locomotive cranes is decidedly limited, except for inquiries which have been pending for some weeks. Contractors are bidding on some sizable projects including subway work in New York, a large drain construction in the local New Jersey district and a hydroelectric project and have asked for prices on steam shovels and derricks. The Amtorg Trading Corporation, New York, has not yet bought against its list of locomotive cranes, crawlers and steam shovels for Russia: two crawl-tread cranes for the Hell Gate power station in New York are still pending and locomotive cranes have not yet been placed by the Central Railroad of New Jersey and the Standard Oil Co. of New Jersey. The Milwaukee Road, Chicago, has placed two gasoline-driven maintenance of way cranes with the Orton Crane & Shovel Co. and the United States Navy Department has bought a gasoline-driven crawl-tread crane and shovel for the Indian Head Proving Grounds from the same company.

New Inquiry for overhead cranes is rather generally limited to single units and buyers continue to delay placing orders. The F. G. Shaeffer Iron Works, Edgewater, N. J., has closed on a 7½-ton, 3-motor overhead crane with the Box Crane & Hoist Corporation. The Anglo-Chilean Consolidated Nitrate Corporation, New York, in the market for a list of 10 cranes for export to Chile, is expected to buy from companies which have furnished cranes for previous installations of the company.

high school to cost about \$360,000, for which plans are being drawn by Lawrie & Green, 821 North Third Street, Harrisburg, Pa., architects.

Pittsburgh

PITTSBURGH, April 28.—April business has proved disappointing to many dealers in this district and compared with the corresponding month last year is particularly discouraging. Increases over March are reported by a few dealers and total inquiries have improved. The absence of large general inquiries is an unfavorable factor as the leading industrial companies in the district are buying only for immediate needs and are doing little important expansion work for which tools have not already been bought. Railroad buying is light, but is expected to improve next month because of more favorable reports on carloadings and other barometric factors.

Heavy machinery makers in the district are well occupied and are still booking new orders. The Mesta Machine Co. has the order for the merchant bar mill at Ecorse, Mich., which the Great Lakes Steel Corporation is building, and has also been awarded contract for a large slab mill for the Gary plant of the Illinois Steel Co. With these orders the company has sufficient work to occupy its machinery division for the remainder of the year and other large plants in the district are booked nearly as well.

Pittsburgh Crucible Steel Co., Oliver Building, Pittsburgh, has awarded a contract to Mesta Machine Co., Homestead,

Pittsburgh, for blooming mill equipment in connection with expansion program at Midland, Pa., to cost about \$700,000. Considerable portion of mill will be electrified, replacing steam and hydraulic operation.

Hookless Fastener Co., East Arch Street, Meadville, Pa., has awarded general contract to George A. Rutherford Co., Prospect Avenue, Cleveland, for three-story and basement addition, 50 x 70 ft., to cost over \$70,000 with equipment. Wilbur Watson & Associates, 4614 Prospect Avenue, Cleveland, are architects and engineers.

Liberty Explosives Corporation, Pittsburgh, is planning construction of new plant near Dunbar, Pa., to cost over \$100,000 with equipment.

Gulf Refining Co., Frick Annex, Pittsburgh, has acquired property at Syracuse, N. Y., for new oil storage and distributing plant, with tank department to provide for capacity of 21,000,000 gal., divided into five units, to cost over \$90,000 with equipment.

Pittsburgh Plate Glass Co., Frick Building, Pittsburgh, has plans for factory branch, storage and distributing plant at North Kansas City, Mo., totaling 60,000 sq. ft. floor space, to cost more than \$80,000 with equipment. W. R. Bovard, Orear-Leslie Building, Kansas City, Mo., is architect.

Milwaukee

MILWAUKEE, April 28.—April is proving to be the best month this year in the volume of machine tool orders placed. While the total falls considerably below that of the same period a year ago, the gains being made are encouraging. Prospects for May are even more promising and tool builders look for continued activity. Some extensive shop additions are about to be undertaken by large local industries and others are awaiting early action. Inquiry continues active, and the automotive industries are exhibiting greater interest.

Heil Co., Twenty-sixth and Montana Avenues, manufacturer of steel tanks, dump bodies, hydraulic hoists and other motor truck equipment, has acquired manufacturing rights on a portable drying machine, heretofore built in small quantities by Arnold Drier Co., Galesville, Wis., and is planning erection of an addition, 200 ft. sq., part two stories, to cost about \$150,000. Drier is oil-fired, with automatic control, and designed for drying grains and forage crops in field, as well as for industrial drying uses. Julius P. Heil, president of Heil Co., has become vice-president of Arnold Drier Co. G. D. Arnold is president.

Briggs & Stratton Corporation, 1047 Thirteenth Street, Milwaukee, is awarding contracts for a sixth story addition to its main works, adding about 18,000 sq. ft. of manufacturing space, for production of automobile locks and switches, window lifters, light gasoline engines, etc. Inquiry is being made for miscellaneous production equipment. Charles L. Coughlin is president and general manager.

Board of Public Works, South Milwaukee, Wis., is taking bids until May 6 for installation of an electrically operated pumping unit with capacity of 4,000,000 gal. in 24 hr., to replace present steam power pump in municipal waterworks plant. Engineers are Alvord, Burdick & Howson, 8 South Dearborn Street, Chicago. Herman Daehling is city clerk.

National Rivet & Mfg. Co., and Special Stamping & Mfg. Co., Park Place, Mil-

waukeee, are moving equipment to Wau-pun, Wis., for installation in plant of Shaler Co., parent concern, for general concentration of production. Shaler Lock Co. will remain in Milwaukee for present. Some additions will be made to equip-ment of Waupun plant. William Fleming, Jr., is secretary and manager.

MacWhyte Co., Kenosha, Wis., manu-facturer of wire rope, cable, etc., has re-ceived order from Douglas Aircraft Co., Santa Monica, Cal., for streamline tie-rods, bracing wires and fuselage cable for 260 observation ships to be built for Government.

Southwestern Wisconsin Gas Co., Chi-cago, has placed contract with Butane Gas Installation Co. for construction of gas producer and distribution plants in Sparta, Tomah and Minocqua, Wis., where franchises recently were granted. Total cost is about \$225,000. Byron T. Gifford, Chicago, is president.

A. O. Smith Corporation, Milwaukee, is taking bids through Holabird & Root, architects, 333 North Michigan Avenue, Chicago, for new administration and re-search building, 140 x 160 ft., eight stories and basement, to cost about \$750,000. E. W. Burgess is chief plant layout engi-neer.

Mark Coyne, 907 Second Avenue, Esca-naba, Mich., general machinist, has broken ground for one-story machine shop addition, 40 x 100 ft. Investment will total about \$30,000.

Crane Co., Chicago, with Milwaukee branch at 100 Second Street, has acquired site at Capitol Drive and Milwaukee Road tracks for new warehouse, service station and display building, 100 x 200 ft., two stories and basement, costing about \$150,-000. Elmer M. Faul is branch manager.

Twin City Iron & Wire Co., 35 Water Street, St. Paul, Minn., has plans for a new plant to be erected in Superior, Wis. No estimate of cost is as yet available.

Detroit

DETROIT, April 28.—Ford Motor Co., Dearborn, has acquired 30 acres at Seattle for new assembling plant, to cost over \$1,000,000 with equipment. Com-pany is completing similar plant at Long Beach, Cal., and will soon begin opera-tions at that point. Plans have also been prepared for a new assembling plant at Richmond, Cal., where property was secured several months ago, to cost close to \$1,500,000 with equipment. This plant will replace present assembling works at San Francisco.

Department of Public Works, South Haven, Mich., has awarded general con-tract to O. F. Miller, Pratt Building, Kalamazoo, for addition to municipal electric light and power plant, to cost about \$100,000 with equipment. Giffels, Hamilton & Weeber, Grand Rapids Na-tional Bank Building, Grand Rapids, are consulting engineers.

Michigan Power Door Co., Detroit, has been organized with a capital of 5000 shares of stock, no par value, to take over and expand company of same name with headquarters at 7310 Woodward Avenue, manufacturer of automatic door openers, door checks, fireproof doors, etc. New company is headed by Alfred E. Farley and Vernor W. Schilder.

Michigan Limestone & Chemical Co., Rogers City, has plans for a new power plant, to cost over \$65,000 with equip-ment. Stevens & Wood, Inc., 53 West Jackson Boulevard, Chicago, is architect and engineer.

Muskegon Motor Specialties Co., Mus-kegon, Mich., manufacturer of automo-bile equipment and accessories, is ar-ranging for merger with Jackson Motor Shaft Co., Jackson, Mich., manufacturer of kindred products, and will increase capacity. First-noted company will in-crease capital from 187,500 to 500,000 shares of stock, no par value, part of proceeds to be used for consolidation and expansion.

Pure Oil Co., Mount Pleasant, with headquarters at 35 East Wacker Drive, Chicago, is considering new refinery on 55-acre tract at Bay City, about 35 miles east of oilfield properties of company in Mount Pleasant district. Permission has been secured to construct a pipe line between two points and right-of-way purchased.

Detroit Gray Iron Foundry Co., 6403 Wight Street, Detroit, has plans for a one-story addition, to cost about \$40,000 with equipment. Mildner & Elsen, Hamm Building, are architects.

Cadillac Motor Car Co., 2860 Clark Street, Detroit, is planning manufacture of a line of V-type engines for aircraft and marine service, and will develop facilities for this production.

St. Louis

ST. LOUIS, April 28.—Board of Public Service, City Hall, St. Louis, has plans for airplane hangar and lean-to, 100 x 160 ft., and 20 x 160 ft., with re-pair and reconditioning facilities at air-port at Natural Bridge and Bridgeton Station Road, to cost about \$80,000 with equipment; also, for similar unit at same location, 90 x 120 ft., with lean-to on each side, 16 x 120 ft., to cost about \$50,000 with equipment. Department of Buildings and Bridges, City Hall, L. R. Bowen, chief engineer, is in charge.

Union Electric Light & Power Co., Twelfth and Locust Streets, St. Louis, has excavations under way for hydro-electric power development on Osage River, near Bagnell, Mo., including power dam and generating plant. Transmission line will be built. Entire project will cost over \$5,000,000. Stone & Webster Engineering Co., 49 Federal Street, Bos-ton, is engineer.

Buchanan Elevator Co., 1620 South Fourth Street, St. Joseph, Mo., has plans for two additions to grain elevator, to cost over \$125,000 with elevating, con-veying and other mechanical equipment. J. S. Metcalfe Co., 111 West Jackson Boulevard, Chicago, is engineer.

F. M. Stambaugh & Sons, Inc., 4356 Maffit Avenue, St. Louis, manufacturer of tools, devices, etc., has awarded gen-eral contract to F. F. Meckfessel Con-struction Co., 6625 Delmar Boulevard, for one-story addition, 100 x 132 ft., to cost about \$100,000 with equipment. Julius Tarling, 2806 North Grand Boulevard, is architect.

Officials of Phillips Petroleum Co., Bartlesville, Okla., and Oklahoma Nat-ural Gas Co., Oklahoma City, have formed joint subsidiary under name of Philokla Gas Co., to operate natural gas prop-erties, including compressor stations, pipe lines, etc., utilizing gas from oilfield near Oklahoma City after it has passed through Phillips plants for extraction of gasoline. It is proposed to construct a plant and system with capacity of 25,-000,000 cu. ft. per day. Phillips company has plans for gasoline refinery in Okla-homa City field, to cost over \$500,000 with machinery.

Hillyard Chemical Co., 801 South Ninth Street, St. Joseph, Mo., manufacturer of industrial chemicals, etc., has plans for two-story storage and distributing plant, to cost about \$140,000 with equipment. E. R. Meier, Bartlett Building, is archi-tect.

Missouri Natural Gas Co., 1017 Olive Street, St. Louis, is planning natural gas storage and distributing plant at Farm-ington, Mo., to cost over \$100,000.

United Power & Light Corporation, Abilene, Kan., has plans for a five-story steam-operated electric generating plant at Manhattan, Kan., 85 x 112 ft., to cost over \$200,000 with machinery. Henry B. Winter, Ulrich Building, Abilene, is architect.

Chicago

CHICAGO, April 28.—Sales of machine tools the past week were very heavy and some dealers now report April busi-ness the best so far this year. Instru-mental in this were the closing of lists by the Santa Fe and the Milwaukee Road, heavy purchases of machinery for the Nash Motors Co.'s Milwaukee plant and the bulk of \$2,000,000 worth of equipment by the Majestic Household Utilities Corporation, Chicago.

Fresh inquiry at the moment is not large. The Milwaukee Road's car shop list is pending. Caterpillar Tractor Co., Peoria, Ill., contemplates issuing a list and it is reported that Allis-Chalmers Mfg. Co., Milwaukee, will buy consider-able new forge shop equipment. The Chi-cago & North Western will purchase a 75-ton hydraulic bushing press and a car-wheel lathe; the Chicago Board of Edu-cation has added to its list a ball-bearing grinder, an 11-in. lathe, an electric drill, and a motor-driven grinder. Nash Mo-tors Co. is studying its needs at Racine, Wis., and A. O. Smith Corporation, Mil-waukee, may soon enter the market.

Continental Air Services, Inc., 2420 South Parkway, Chicago, has awarded a general contract to J. A. Johnson, 5238 Milwaukee Avenue, for a two-story hangar with repair and reconditioning facilities at Chicago municipal airport, to cost about \$55,000. R. V. Murlison, 343 South Dearborn Street, is architect.

Aridor Co., 589 East Illinois Street, Chicago, manufacturer of metal caps for jars and containers, pouring nozzles and kindred products, has plans for one and two-story plant, 132 x 350 ft., to cost \$130,000 with equipment. A. Epstein, 2001 West Pershing Road, is architect and engineer. P. S. Moyer is president.

Swift & Co., Union Stock Yards, Chi-cago, are arranging an expansion and im-provement program to cost about \$2,000,-000, including construction of meat and produce-packing plants, ice-manufactur-ing and refrigerating plants, and exten-sions in existing plants of this kind. Company engineering department will be in charge.

F. L. Salter Co., Lonsdale Building, Duluth, Minn., has awarded a general contract to Alfred Fredstrom, Arlington Avenue, for one-story machine shop, 25 x 100 ft., to cost about \$35,000 with equip-ment. Gillison, Ellingsen & Agnew, Tor-rey Building, are architects.

Central States Power & Light Cor-poration, Dubuque, Iowa, is planning con-struction of a new steam-operated elec-tric generating plant at Harvey, N. D.,

to cost over \$150,000 with transmission lines. Company engineering department is in charge. Operations are under direction of Utilities Power & Light Corporation, 327 South La Salle Street, Chicago.

Northwest Automatic Products Co., 138 Holden Street, Minneapolis, Minn., has plans for a new one-story plant, 85 x 90 ft., to cost about \$30,000 with equipment. Martin G. Lindquist, Security Building, is architect.

City Council, Des Moines, Iowa, is considering construction of municipal airport, including hangar, repair shops, oil storage and other field units, to cost over \$250,000. City engineering department will be in charge.

Cowling Pressure Relieving Joint Co., 160 North Wells Street, Chicago, manufacturer of building products, has leased space in building at 224 West Superior Street, totaling 5000 sq. ft., for expansion.

Material & Equipment Inspection Bureau, Chicago, Ill., has been organized with offices at 232 South Michigan Avenue. Francis L. Harris is in charge of purchasing and B. C. Rinehart will supervise engineering. Bureau is prepared to render service in field of inspection, purchasing and liquidation.

Wachs-Gregg & Co. is new name under which machine tool business of Stocker-Rumely-Wachs Co., 117 North Jefferson Street, Chicago, will be known after May 1. Edward H. Wachs and C. R. Gregg have conducted Stocker-Rumely-Wachs Co. for past two years. Wachs-Gregg & Co. will continue to represent all companies formerly handled by Stocker-Rumely-Wachs Co.

Claude S. Gordon Co., 708 West Madison Street, Chicago, has purchased Cleveland Instrument Co., 1988 East Sixty-Sixth Street, Cleveland, and General Pyrometer Supply Co., 2902 Carnegie Avenue, Cleveland. Gordon company will consolidate these two companies under name of Pyrometer Service & Supply Corporation, which will be located at 1988 East Sixty-sixth Street, Cleveland. New company will take over all service, repair and supply business of companies which are consolidated.

Indiana

INDIANAPOLIS, April 28.—Big Four Railroad Co., Big Four Building, Cincinnati, has taken bids on general contract for one-story shop unit, 184 x 444 ft., at repair shops, Beech Grove, near Indianapolis, to cost over \$160,000 with equipment. It will replace a shop recently destroyed by fire. Hadley Baldwin, address noted, is chief engineer.

Showers Brothers Co., Morton Street, Bloomington, manufacturer of kitchen cabinets, etc., is contemplating a one-story addition, to cost about \$60,000 with equipment.

Guide Lamp Corporation, Anderson, manufacturer of automobile lamps, headlights, etc., a subsidiary of General Motors Corporation, is planning a one-story addition, totaling about 100,000 sq. ft. floor space, to cost over \$400,000 with machinery. Fred S. Kimmerling is president and general manager.

Board of Education, Hammond, plans installation of manual training equipment in two-story junior high and grade school in Franklin and West Park districts, to cost about \$360,000, for which bids will be asked at once on general contract. L. C. Hess, First Trust Building, is architect.

Board of Public Works, Garrett, will soon take bids for three-story and base-

ment addition to municipal electric light and power plant, 45 x 70 ft., to cost over \$60,000 with equipment. A. M. Strauss, Cal-Wayne Building, Fort Wayne, is architect.

Hardware Supply Co., 2714 Ohio Street, Terre Haute, has awarded general contract to Glenn North Construction Co., Ninth and Tippecanoe Streets, for one and one-half story and basement storage and distributing plant, 80 x 200 ft., to cost about \$45,000 with equipment. Charles W. Allen, Swope Block, is architect.

Elcar Motor Co. and Levers Motor Corporation, both manufacturers of automobiles with plants at Elkhart, have arranged for merger. Consolidated company will have a capital of 500,000 shares of stock, no par value, and will carry out improvements, including concentration of production for parts manufacture and assembling at local plants.

Indiana Oxygen Co., 439 Harmon Street, Indianapolis, manufacturer of industrial oxygen, etc., will erect two-story and basement plant, 90 x 195 ft., to cost over \$50,000 with equipment. Bishop, Knowlton & Carson, 312 North Meridian Street, are architects.

Cincinnati

CINCINNATI, April 29.—Demand for machine tools in this district has been spotty. Lathe builders have booked sufficient one and two-tool orders the past week to bring April business above that of March. On the other hand, orders for heavier tools have been about on the same level as last week, making the monthly total less than in March. Inquiry continues brisk, but consumers appear reluctant to buy equipment until their business picks up. Production continues at less than capacity and no change is noted in the rate of operations.

General Kontrolor Co., 200 East First Street, Dayton, Ohio, manufacturer of electric control equipment and devices, is considering new one-story plant, to cost about \$80,000 with equipment. Gisbert L. Bossard is president.

Plough Chemical Co., 121 South Second Street, Memphis, Tenn., is contemplating call for bids on revised plans for new factory, to cost over \$400,000 with machinery.

Henry Vogt Machine Co., Louisville, manufacturer of ice-making and refrigerating equipment, has plans for a multi-story addition, to cost about \$40,000 with machinery.

Richard Z. Dawson, 79 East State Street, Columbus, Ohio, architect, has plans for airplane hangar at Columbus airport, including repair and reconditioning facilities, to cost about \$125,000 with equipment, for company whose name is temporarily withheld.

Imperial Foundries Co., 218 Kentucky Street, Knoxville, Tenn., contemplates early rebuilding of part of plant recently destroyed by fire.

Hamilton County Board of Education, Chattanooga, Tenn., has awarded general contract to Rogers & Leventhal for new manual training and gymnasium building at central high school, to cost about \$80,000 with equipment. R. H. Hunt Co., James Building, is architect.

Louisville Gas & Electric Co., Louisville, has plans for extensions in power plants, transmission lines, new power substations, etc., to cost \$4,300,400. Steel tower transmission line will be built to Cincinnati in cooperation with Cincinnati

Gas & Electric Co., to cost \$1,750,000. Company is operated under direction of Byllesby Engineering & Management Corporation, 231 South La Salle Street, Chicago.

Smith Motor Coach Co., Washington and Front Streets, Memphis, Tenn., has plans for one-story motor coach service, repair and garage building, 86 x 175 ft., at Paducah, Ky., to cost about \$100,000 with equipment. Jones & Furbinger, Port Building, Paducah, are architects.

Board of Education, Ludlow, Ky., will install manual training department and laboratories in new three-story high school, to cost \$200,000. F. J. Porter, 1714 North High Street, Columbus, Ohio, is architect.

Gas Research Co., Dayton, Ohio, builder of industrial gas producer equipment and manufacturer of household gas producer equipment, has moved its factory from 914 Miami Chapel Road to 501 East Third Street.

International Derrick & Equipment Co., Columbus, Ohio, has purchased Leidecker Tool Co., Marietta, Ohio, one of the oldest drilling and fishing tool manufacturers in oil industry.

Gulf States

BIRMINGHAM, April 28.—Dallas Power & Light Co., Dallas, Tex., has applied for permission to carry out power development at Mountain Creek, to cost \$8,587,000, including construction of reservoir for water supply, to cost \$1,500,000, and new steam-operated electric power plant with capacity of 35,000 kw., to cost \$5,500,000, with extensions in transmission lines.

Southern Kraft Corporation, 466 Michigan Avenue, Mobile, Ala., has plans for paper mill on site recently acquired at Panama City, Fla., and company engineering department will be in charge of design and erection. It will have initial capacity of 200 tons per day and cost over \$5,000,000 with machinery. Major J. H. Friend is vice-president. Company is a subsidiary of International Paper Co., New York.

Texas Fuel Gas Co., Del Rio, Tex., plans construction of a pipe line from Rycade Oil Co. properties on Chittim lease, Maverick County, to Eagle Pass, Del Rio and vicinity, about 65 miles, for natural gas supply, to cost over \$250,000 with compression stations, etc. Gas will be furnished for power plant of Central Power & Light Co., at Del Rio.

Alamo Iron Works, Corpus Christi, Tex., has work under way on a one-story addition for storage and distribution, to cost about \$40,000 with equipment.

Board of Jefferson County Commissioners, Birmingham, has plans for a one-story mechanical shop, 75 x 160 ft., one-story boiler plant, 40 x 40 ft., and one-story mechanical laundry, 45 x 100 ft., at Ketona, Ala., to cost over \$75,000 with equipment. C. J. Rogers, Martin Building, Birmingham, is architect.

City Council, McAllen, Tex., has plans for an all-steel hangar at municipal airport to house six airplanes at one time, with repair and reconditioning facilities, to cost over \$45,000 with equipment.

Houston Oil Co., Houston, Tex., has authorized a bond issue of \$25,000,000 of which a block has been sold for \$12,000,000, part of proceeds to be used for expansion and improvements in oil properties and refineries, including extensions in natural gas pipe line facilities of Houston Pipe Line Co., a subsidiary.

Navajo Refining Co., Kings Mill, Gray County, Tex., care of G. E. McQuillan, Amarillo, Tex., recently formed by Mr. McQuillan and associates, has plans for oil refinery at Kings Mill, to cost over \$400,000 with machinery.

Lone Star Gas Corporation, Dallas, Tex., has plans for a pipe line from Texas Panhandle to Lincoln, Neb., and vicinity, by way of Council Bluffs, Iowa; Lincoln and Beatrice, Neb., and other points, totaling 900 miles of pipe, for natural gas service, to cost over \$3,000,000 with compression stations and equipment. L. B. Denning is president.

Cleo Co. of America, Inc., Pierce and Polk Streets, Tampa, Fla., operating a soft drink bottling plant, will carry out expansion and improvements, including installation of mixing machinery, bottling and washing machines, motors and other power equipment, to cost about \$30,000. R. A. Thorne, is president.

Indian River Canning Co., Fort Pierce, Fla., care of T. S. Kirby, manager American Fruit Growers, Inc., Fort Pierce, recently organized by Mr. Kirby and associates with capital of \$100,000, is planning local fruit and vegetable canning plant, including installation of mixing tanks, elevating and conveying equipment, sealing and other equipment, to cost over \$70,000 with machinery.

Cleveland

CLEVELAND, April 28.—Machine tool business showed a little improvement the past week in both orders and inquiry. The General Electric Co. purchased eight or 10 machines, including lathes, tool room grinders and bench lathes, from local dealers for its radiotron plant at Harrison, N. J. The Republic Steel Corporation is placing several machines for its maintenance department. These will include two lathes, a shaper and a planer. While no new sizable lists came out the past week, dealers received inquiries for quite a number of single machines. Business with some dealers showed a gain in April over March; sales by some manufacturers fell off as compared with March.

Allied Oil Co., 1021 Guarantee Title Building, Cleveland, will soon take bids on general contract for two-story oil storage and distributing plant, to cost about \$125,000 with equipment.

Union Steel Products Co., 13009 Athens Avenue, Cleveland, has plans for one-story plant on Jennings Avenue, 60 x 100 ft., to cost about \$50,000 with equipment. W. H. Hatch, Hippodrome Building, is architect.

Celina Mfg. Co., Celina, Ohio, manufacturer of tanks, fountains and kindred equipment, has awarded general contract to Hisey & Rebout, 118 South Washington Street, Van Wert, Ohio, for one-story addition, to cost about \$45,000 with equipment.

General Electric Co., Union Trust Building, Cleveland, and Schenectady, has plans for four-story factory branch, storage and distributing plant at 4900 Woodlawn Avenue, Cleveland, to cost over \$500,000 with equipment. H. K. Ferguson Co., Hanna Building, is architect and engineer.

Euclid Machine & Engineering Co., 1838 Noble Road, Cleveland, has plans for one-story addition, 75 x 100 ft., to cost over \$50,000 with equipment. E. G.

Hoefler, 5005 Euclid Avenue, is architect.

Hahn Foundry Co., Canton, Ohio, recently incorporated by T. J. Hahn, John G. Yost and J. C. Randles, has taken over former plant of Dick Mfg. Co. for production of gray iron and semi-steel castings. Operations have been begun.

Surface Combustion Co., 2375 Dorr Street, Toledo, Ohio, announces a \$250,000 expansion program, which will include extension of present factory and office building. Company manufactures industrial and heating equipment, demand for which, it is stated, has grown rapidly since removal from New York to Toledo in 1927.

Ohio Steel Foundry Co., Lima and Springfield, Ohio, has purchased steel foundry department and steel casting business of Industrial Brownhoist Corporation, Cleveland, and Bay City, Mich. Steel foundry at Bay City will be operated by Ohio Steel Foundry Co., beginning May 1. Improvements are planned, including a 15-ton open-hearth furnace.

Pacific Coast

SAN FRANCISCO, April 24.—Douglas Aircraft Co., Inc., 3000 Ocean Park Boulevard, Santa Monica, Cal., manufacturer of airplanes and parts, has plans under way for a one-story addition, 40 x 240 ft., at Clover Field, to cost over \$75,000 with equipment.

New England Sheet Metal Works, Fresno, Cal., has begun construction of one-story plant, to cost close to \$30,000 with equipment.

S. Cozad, 783 East Seventeenth Street, Los Angeles, has plans by W. J. Saunders & Son, 785 East Pico Street, architects, for one-story machine shop, 40 x 70 ft., on adjoining site, to cost about \$20,000 with equipment.

Cutler-Lobingier Packing Co., Ontario, Cal., plans installation of conveying, loading, packing and other mechanical-handling equipment, in new one-story fruit packing plant, to cost about \$230,000 with machinery. Austin Co. of California, Inc., Oakland, is architect and engineer.

Edwards Ice Machinery & Supply Co., Security Building, Seattle, contemplates a new local plant for manufacture of ice-making machinery, refrigerating equipment, etc., to cost over \$50,000 with equipment.

City Council, Price, Utah, has plans for a municipal electric light and power plant, including installation of Diesel engine-generator unit and accessories, to cost over \$75,000 with machinery. Carl Nyman is city engineer, in charge.

Crown Motor Carriage Co., Los Angeles, has plans for one-story storage and distributing plant, with repair facilities, 140 x 140 ft., to cost over \$80,000 with equipment. Harry T. Honn, Beaux Arts Building, is architect.

Alameda Airport, Inc., Alameda, Cal., has awarded a general contract to Lindgren & Swinerton, Inc., 225 Bush Street, San Francisco, for one-story hangar, 120 x 450 ft., with repair shop and other mechanical facilities, to cost about \$100,000 with equipment.

Southern California Edison Co., Los Angeles, is arranging an expansion and improvement program for new equipment storage and distributing plants, new power substations and other operating buildings in several cities, to cost over \$200,000 with equipment. Company engineering department is in charge.

Santa Catalina Island Co., Avalon, Catalina Island, Cal., is considering establishment of airplane landing field, to include hangar with repair facilities and other structures, to cost over \$80,000 with equipment. D. M. Renton is general manager.

Los Nietos-La Puente Valley County Water District, Puente, Cal., will receive bids until May 13 for a deep-well turbine pumping unit with accessories. E. Rambaud is superintendent.

Monarch Forge & Machine Works, 690 York Street, Portland, Ore., has purchased adjoining property, 100 x 150 ft., for expansion.

Canada

TORONTO, April 28.—Ratepayers of Crowland Township, Ont., have granted fixed assessment of \$285,000 on plant and properties of Page-Hersey Tubes, Ltd., for ten years, and company will start work at once on erection of a seamless tube mill to cost \$2,000,000.

Canada Cement Co., Montreal, has plans for an addition and will change equipment in its present buildings from dry to wet process. Total cost is estimated at \$1,500,000.

General Conveyors, Ltd., North Plainfield, N. J., has purchased a building at Joliette, Que., and will remodel for manufacturing at a cost of about \$150,000. Company has been incorporated in Canada with a capital stock of \$250,000, but no new financing will be necessary for proposed undertaking.

A by-law granting a fixed assessment of \$208,880 for ten years to Canadian Mead-Morrison Co., Ltd., Welland, Ont., has been carried and company will proceed with erection of an addition to cost \$30,000.

J. Evans, architect, 30 Water Street North, Galt, Ont., has plans for a two-story addition for Sheldon's, Ltd., 96 Grand Street South, manufacturers of engines, blowers, fans, etc.

Bids are being received, no closing date, by B. H. and Fred Frack, architects, Pigott Building, Hamilton, Ont., for a four-story addition, 50 x 100 ft., for B. Greening Wire Co., Queen Street, North.

Plans are under way for a factory at Montreal for Stanley Products, Ltd., Hotel London, London, Ont., to manufacture oil burning furnaces, boilers, etc.

Town Council, Sudbury, Ont., will build power plant at a cost of \$10,381, and is in the market for transformers and other electrical equipment. R. H. Martindale is superintendent of Water and Light Department. Town Council is also in the market for a 2000-gal. per min. turbine pump and motor, with accessories, for installation at David Street water-pumping station.

Foreign

OFFICIALS of Goodyear Tire & Rubber Co., Akron, Ohio, have organized Goodyear Tire & Rubber Co. of Argentina, Inc., a subsidiary, to operate in South America. About 50 acres will be purchased near Buenos Aires as site for mill to manufacture tires, tubes and other rubber products, to cost over \$500,000. New company will operate with capital of \$600,000. P. W. Litchfield, head of parent organization, will be president and chairman of board.

Continental Can Co., 1 Pershing Square, New York, has acquired a substantial in-

The Week's News Quickly Told

Current Events That Bear on the Course of Business

PRODUCTION of goods is manifestly being adjusted to current consumption, the National Business Survey Conference finds. It also notes continued caution in merchandising policies and retail distribution.

COMMODITY price index, after minor fluctuations at what appeared to be a low level, again drops. It is now at the lowest figure since 1916. Weaknesses in grains and metals largely contribute to this decline . . . May wheat quotation at Chicago of \$1.01½ is lower than current price in foreign markets, despite Federal Farm Board's attempts to maintain a preferential domestic price in favor of American farmer.

QUARTERLY reports of earnings by transport and most manufacturing industries show shrinkage as compared with the corresponding period last year. Exceptions (so-called depression-proof industries) are public utilities, food industries, amusements, electric, farm and office equipment manufacturers.

AUTOMOBILE industry is expanding its operations to a rate now about equivalent to a "normal business year" . . . General Motors Corporation delivered 287,000 cars to domestic consumers last quarter, as compared to 351,000 a year previous . . . Stewart-Warner Speedometer Corporation's net was hardly one third that of the first quarter of 1929 . . . National Safety Council reports that motor cars are responsible for 31,000 of the 97,000 accidental deaths in the United States during 1929, and that the proportion is constantly increasing.

RAIL rates imposed by State commissions will not be reviewed by the Supreme Court unless they are confiscatory in nature . . . Great

Northern Railroad has cut running time between Minneapolis and the Coast by five hours, thus saving a business day, by means of faster locomotives and electrification of an easier route through the Cascade tunnel . . . Vigorous opposition by other railroads causes Baltimore & Ohio Railroad to withdraw its projected \$5.50 rate, New York to Washington, competitive with bus fares . . . Wabash Railway accepts the Interstate Commerce Commission consolidation plan, and makes tenders for other roads comprising the proposed trunk system, including the Seaboard Air Line, Lehigh Valley, Norfolk & Western, Western Maryland and Wheeling & Lake Erie.

SHIP subsidies were authorized on 24 mail carrying routes by the Coolidge administration . . . Among the 16 other new routes negotiated during the last year are three contracts signed last week with the United States Lines requiring the expenditure of \$78,000,000 and the construction of two new vessels of 45,000 tons with a speed of 28 knots for the North Atlantic service . . . Hog Island, the wartime shipbuilding plant on the Delaware River, will be sold to Philadelphia for \$3,000,000 for development into a marine, air and rail terminal.

AIR transport between Chicago and San Francisco, on 20-hr. day and night schedule, is started by Boeing Lines . . . National Air Transport Corporation, air mail carrier between New York and Chicago and New York and Dallas, Tex., is acquired by United Aircraft & Transport, Inc., which already controls Boeing Lines, thus establishing a transcontinental route.

CHICAGO must construct sewage disposal plants before 1938 and reduce diversion of Lake Michigan

water for dilution purposes to 1500 cu. ft. per sec., in order to comply with mandate from Supreme Court . . . Twenty-eight men are branded as public enemies by Chicago Crime Commission. A "hoodlum squad" has been organized within the police department to harass these gangsters until they are driven from the city.

PETROLEUM production has been held steady by agreement among well owners so that stored crude is being drawn upon for current requirements. The price has slightly advanced . . . Gasoline stocks are also being drawn upon . . . Standard Oil of California has published a price for gasoline in cargo lots at 6½c. per gal. Surplus refinery output has previously been sold by bargaining . . . Gasoline is produced commercially from low grade crude by a hydrogenation process similar to the one used in Germany on brown coal, and licenses are offered to other producers by Standard Oil of New Jersey . . . Moody Seagraves Co., which is building a 24-in. pipe line across Kansas, merges with companies holding extensive natural gas lands in Texas and many public utilities in Nebraska, Iowa and Kansas . . . Sinclair company settles for \$3,250,000 the Government's suits to recover the value of oil extracted from Tea Pot Dome and the Salt Creek Field.

BRITISH income tax on the lowest bracket (\$750 to \$10,000) is increased 2½ per cent to 22½ . . . Civil disobedience in India has led to extensive rioting, general strikes, and boycotts of foreign-made goods, especially British textiles. Laws taxing salt have caused widespread "homebrew and bootlegging." Nationalistic leaders desire conferences to determine preliminary steps necessary to end certain economic abuses and lead ultimately to independence.

terest in Metal Box & Printing Industries, Ltd., London, England, and will be active in management. Rights for use of can-making machinery and equipment of Continental company have been granted British company, which will develop facilities for such purpose. Carle C. Conway, chairman of board, and O. C. Huffman, president of Continental company, will become members of board of directors of Metal Box organization.

Lautaro Nitrate Co., Ltd., operated by Anglo-Chilean Consolidated Nitrate Corporation, 120 Broadway, New York, will soon begin construction of new steel units at plant in Chile, for which contract for structural steel has been let to United States Steel Products Co., 30 Church Street, New York, for increase in capacity of nitrate soda and similar specialties, to cost over \$2,500,000 with machinery.

Swedish Match Co., Stockholm, Sweden, is planning new plant in Australia, to cost over \$1,000,000 with machinery. Company is affiliated with Kreuger & Toll Co., Ltd., Stockholm.

New Publications

Are Welding in Industry.—General Electric Co., Schenectady, N. Y. 40-page booklet GEA-995A, contains many illustrations of production welding of rolled steel into machinery frames, structures, roofs and floors, tankage, pipe, and various machine and automobile parts.

Rebuilt Motors, Generators, Turbines, etc.—Rockford Power Machinery Co., Rockford, Ill. Bulletin 37 of 68 pages, illustrating and describing various types of motors, with both alternating and direct current. Specifications and price tables are given.

Combination Shears and Punches.—Henry Pels & Co., Inc., 90 West Street, New York. Catalog MC-30, illustrating and describing, in 11 pages, various types of punches and shears with both belted and geared motor drive. Tables of capacity and specifications are included.

Heating and Ventilating Unit.—Reznor Mfg. Co., Mercer, Pa. Twelve-page pamphlet, illustrating and describing gas-fired warm-air heaters suitable for use in schools, churches, theaters, hotels, etc. Type 1-UR provides delivered capacities up to 50,000 B.t.u. an hour; type V (several of the others in a single casing), up to 400,000 B.t.u. an hour.

Electric Hoists.—Robbins & Myers, Inc., Springfield, Ohio. Bulletin 5031, of 16 pages, illustrates and describes various types of electric hoists for industrial use. Capacity, specifications and price tables are given. Hoists for low headroom are featured.

Steel Castings.—Chicago Steel Foundry Co., Chicago. A four-page leaflet, illustrated, entitled "Rules Won't Make Steel Castings," gives some facts concerning "Evansteel," an alloy for hard service, produced in three grades. The physical properties of each one are given.

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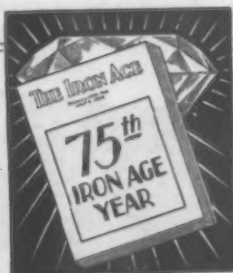
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